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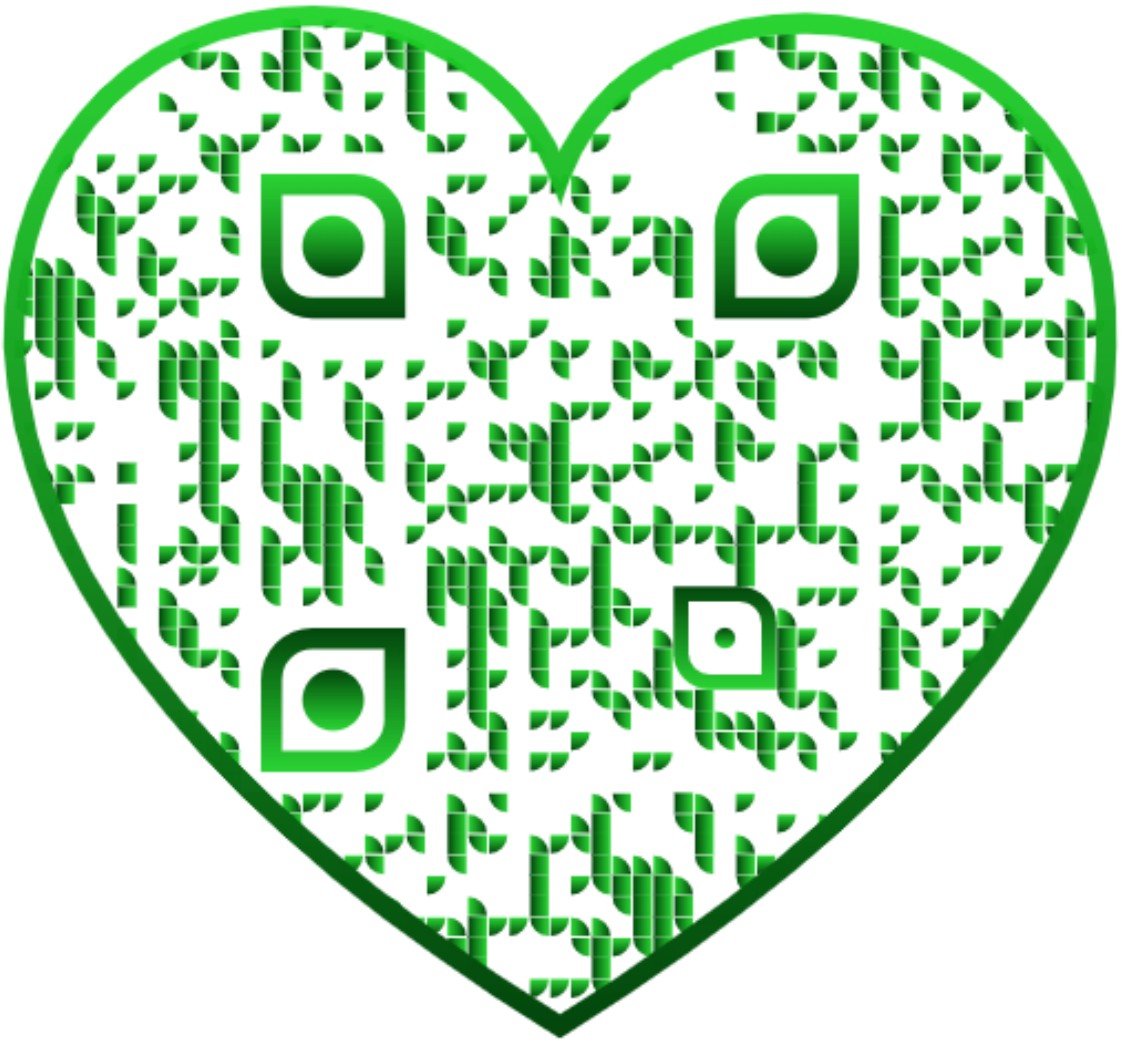

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Welcome

Hello everyone, and welcome to the latest edition of our *Guitar & Bass Classics* series. It's another one for amp-lovers of all types to savour. Given the amount of all-things-amp-related ground there is to cover, we don't apologise one iota for the variety of features on offer within these pages. Whether it's helping you to buy, build or modify an amp or learn about the enthralling history of amp types and models, everything you see in this special is included to satisfy as many tonehounds as possible. We've also included a list of what we consider to be the greatest amps of all time. Now, we understand that's proper fightin' talk, so feel free to disagree with our choices – it's all part of the fun.

If nothing else, we pray that the *Guitar Amp Bible 2015* will once again prove how important amps are to guitar players. While choosing the right guitar for you, and learning to play it as well as possible, is a righteous path to take, if you don't get the right amp – and know how to use it – then you're missing out on a hugely important aspect of your sound.

As always, you can also check out our monthly *Guitar & Bass* magazine, or use those internets to check us out at www.guitar-bass.net, as well as on Facebook and Twitter. For now, we hope you enjoy this special, and wish you the best of luck in all your amp-related endeavours...

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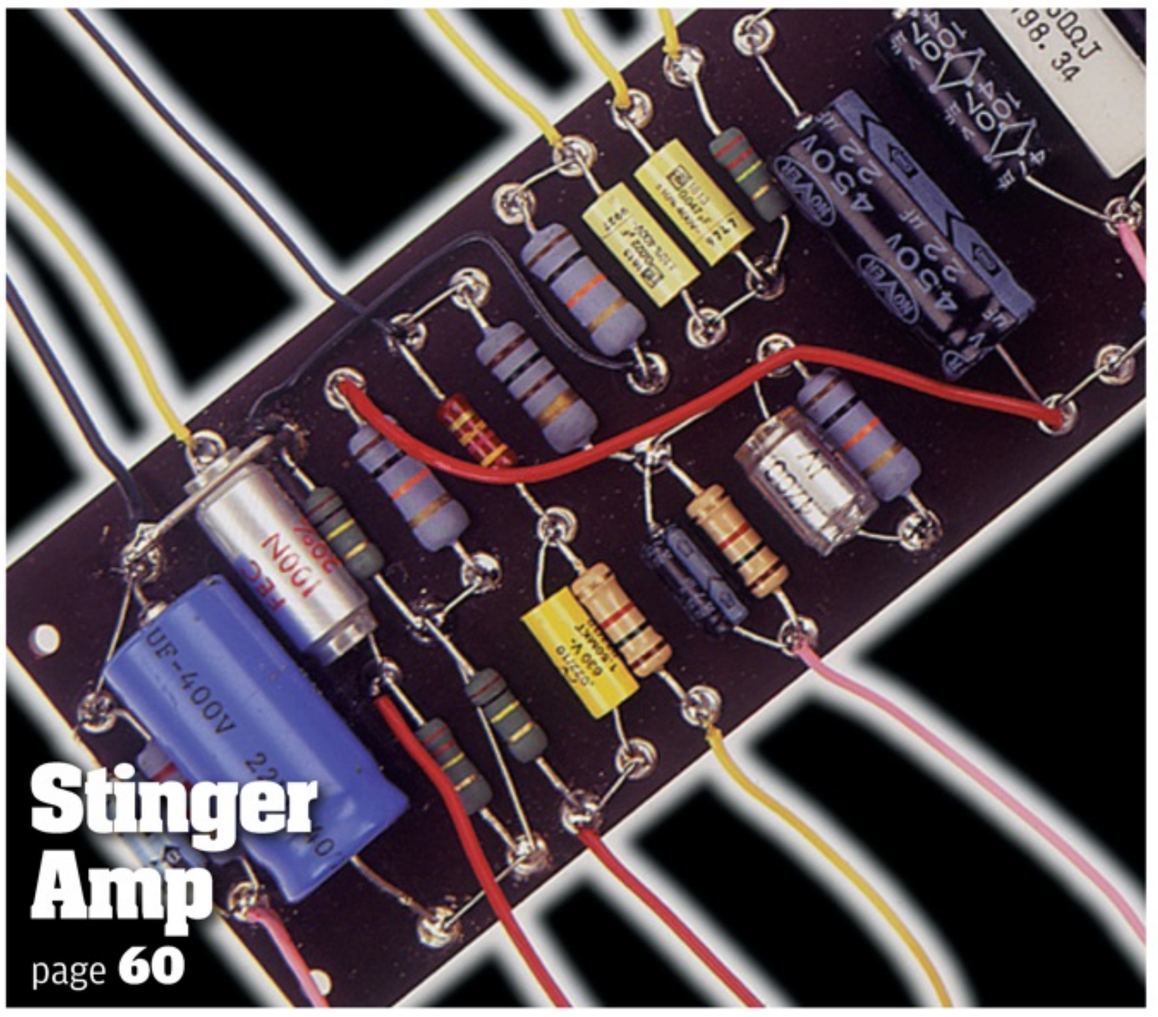

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It Might Get Loud: Amps Of The British Invasion

There are few globally famous UK electric guitars, but when it comes to guitar amplifiers, British is best. From Vox to Marshall, to Hiwatt, Orange, Laney and way beyond, Michael Stephens charts some of the legendary tales of the great British amps...

In diplomacy, it's acknowledged that the USA and Great Britain have a 'special relationship' – and the same can be said for rock'n'roll guitar. While the most famous guitars, fashions and indeed the frisson of early rock were imported from the US, the British were soon delivering their own crucial riposte of the sonic equation: amplification.

After all, what good is a great electric guitar without a great amp? Without an amp, you may as well swing your Fender Stratocaster in front of a mirror and pretend to play tennis.

The all-American Gibson, Fender, Valco/Supro and others all made legendary amps from the early days of course, but when the British also got seriously wiring-and-valving from the 1950s onwards, it launched the still-enviable phenomenon: the Great British Amp. There have been numerous makes and models amid much innovation, and the growth of truly global brands. Something, regrettably, you can't say for many British electric guitar makers.

Throughout this article, *Guitar & Bass* enlisted the expertise of veteran British amp engineer David Petersen – who worked for both Vox and Marshall in the glory years – to tell the story of the UK guitar industry's greatest export. Warning: it might get loud.

Early days of British amps

Two London-based companies, Selmer and Watkins, were key in the rise of UK amp building. Selmer built their first amplifier as early as 1935, at the company's base in London's Charing Cross Road. Post-WWII, in 1947, they bought a PA company called RSA for their expertise and melded the technology into a more-developed line of early guitar amps. Electric guitar amps were then rare in the UK – there were restrictions on US imports until the late '50s, while war-torn Britain tried to rebuild itself by manufacturing everything on home soil.

At first these Selmers were labelled as RSA/Selmer models – and, although it seems quaint now, the RSA TV6 (5W) was dubbed the Popular, and the Truvoice Model TV15 (circa 10W) called the Stadium. Ten Watts or so for a 'stadium', eh? That said, a good tech will tell you with the right mic'ing and PA, you can still deliver killer tone to a stadium with 10W. But that's another story.

A Selmer amp/ lap steel set from the 1940s

Selmer Popular from the 1950s

Selmers on various '60s sessions and in early Led Zeppelin too. Bernard Butler sometimes records with a Zodiac 30, as does Arctic Monkeys' Alex Turner. Jack White used a Zodiac 30 to record the White Stripes' *Elephant* album. Selmer were Brit amp pioneers but, long-term, it didn't last. Even so, you can expect to pay vintage Vox rates for mint '60s Selmer Zodiacs.

Charlie Watkins was another London-based pioneer of the '40s. Watkins was an accordion player, but noticed: 'Whenever I went out and did a gig, you couldn't hear the guitar properly once there was a bit of an audience. The guitarists tried putting heavier strings on and playing with heavy plectrums to get what they called "cut-through". This worked for treble, but the sound was very unsatisfactory. Some guitars, such as Gibsons, were beginning to appear with pickups fitted, and you could get contact mics to fit under the strings, but there were no proper amplifiers available – perhaps a few small units for Hawaiian guitars, but nothing good enough to use with normal guitars.'

In the early 1950s, Watkins used an AC/DC-circuit PA as the basis of his proto guitar amps... until, he said, he 'saw a piece in the *Daily Mirror* about a pop group guitarist getting killed'. Watkins shelved his amps business for a few years before returning with a range of safer AC-only amps. By 1955, skiffle was big and the guitarists needed amps (to go alongside Watkins/WEM PAs). By the early 1960s, with others' help, Charlie had two early British classics – the Westminster and the Dominator.

An early success for Selmer in the US guitar/UK amp combination was The Animals' *House Of The Rising Sun*, a 1964 #1 on both sides of the Atlantic – although The Animals tended to mime on TV with Vox amps, guitarist Hilton Valentine said he played a Gretsch Tennessean through a Selmer for the song's recording.

Selmer amps didn't manage to enter the mass-market pantheon of great British amps in the USA, but they remain coveted by aficionados from both nations. Selmer's Zodiac Twin 30 and Zodiac Twin 50 combos (1963-'65), were a likely response to Voxes and Marshalls of the day, but remain highly collectable.

Selmer Zodiacs ooze retro cool. They blended mock-crocodile/black vinyl with a gold script logo that hinted at Selmer's past in saxophones. Plus, there was the 'magic eye' tremolo speed indicator on the front, which pulsed in time to the trem rate. 'Those croc-covered Zodiacs were incredibly good-looking,' says Petersen. 'But by then, Selmer had lost ground.'

The Kinks used Selmer 30s on early tracks. Jimmy Page used

From the top: a Selmer Zodiac, a Stadium and a trio of Little Giants

TIMELINE
Early history of the British amp

1930s
Henri Selmer's London company start building the first British amps, initially for PA systems

1954
Watkins enter the guitar amp market, bolstering their line of PA systems. 1956's Watkins Dominator amp boasts 17 Watts!

1958
Vox debut their AC15 combo. Session legend Bert Weedon and the Shadows are notable users

1959
Vox market the AC30, as The Shadows wanted more volume. The AC30 is famously used by the Beatles, the Stones and, later, Brian May and The Edge

1962
Marshall start building amps, notably the JTM45, later used by Eric Clapton on John Mayall's Blues Breakers' 'Beano' album

Above, a Watkins Dominator; below, a pair of Westminsters

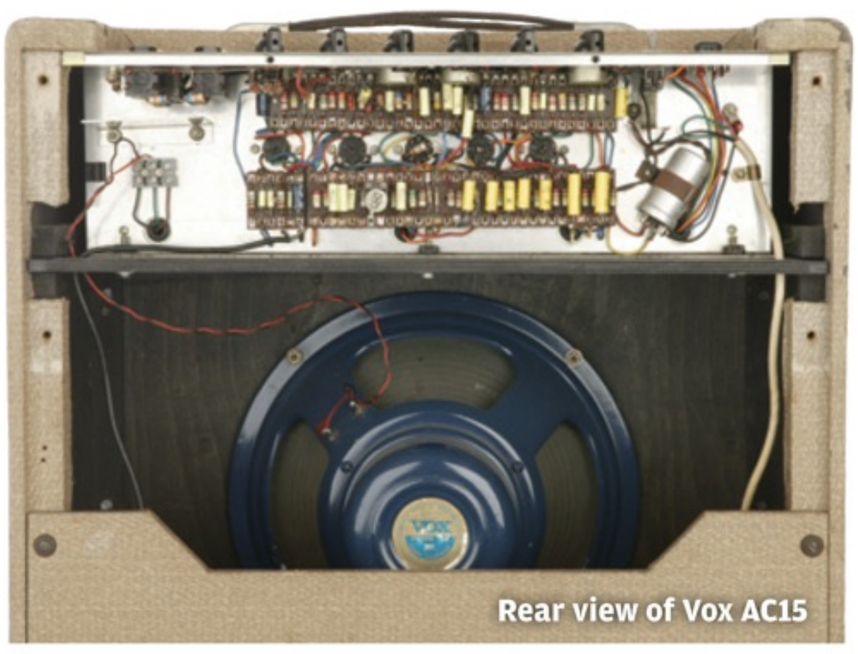
The Watkins Dominator – although a great 'buy me' name – delivered no worldwide domination, but it was a boon to Brit wannabe rockers. In his wry book about early Brit rock'n'roll, *17 Watts*, seasoned bassist Mo Foster remembers his school band the Tradewinds, who had a 5-Watt amp already, but boldly traded-up to a Dominator.

'Do we really need that much power?' guitarist Peter Watkins (no relation to the amp) asked. Even Foster wasn't sure. But when Mo Foster was playing bass for Jeff Beck in the 1970s, his amp backline was a massive 1500W, the equivalent of no less than 88 Watkins Dominators. Loud was soon to become the new lord...

Vox populism

The first British amp maker to 'conquer' America was Vox – with a little help from their friends. The Vox brand grew from the Jennings Organ Company, founded by Tom Jennings in Dartford, Kent. In 1956, Jennings was shown a prototype guitar amp made by Dick Denney, a big band guitarist and workmate from their WWII days as munitions workers. They renamed the company Jennings Musical Industries (or JMI) and in 1958 launched the 15W Vox AC15. Bert Weedon recorded many sessions with an AC15, as did Vic Flick (of the James Bond theme). The Shadows were also early fans, using AC15s even before Hank Marvin had acquired his legendary red Strat.

Hank later recalled: 'Vox was one of the first companies to get onto artists and groups so they could promote their amplifiers. In fact, I tried Fender amplifiers first, but preferred the sound of the Vox with the Strat, because I think it was more of a raw sound. The Fender amplifier, to my ear, sounded a little too smooth with a Strat, and I seemed to get more guts out of a Vox.'



Rear view of Vox AC15

One of Marvin's key words here is 'promote'. Vox were – and still are – brilliant at marketing their already brilliant amps. Vox quoted the AC15 as 'the first amplifier designed specifically for the electric guitar', a daring 'embellishment' of the truth. Even so, the Shadows asked for more volume, akin to the early 25W Fender that Marvin had experimented with: and even 17 watts wasn't enough for the rockin' Hank. The idea of using two AC15s was rejected, so Vox developed the AC30, launched in 1959.

David Petersen remembers, 'Tom Jennings actually vetoed the release of the AC30 for a long time after it existed in the development stage. Tom didn't think anyone would buy anything that "big". He and Dick Denney had huge arguments about introducing the Vox AC30, long after Dick had been "bullied" into building it by the Shadows.

'But the Shadows threatened to go to Fender if Vox didn't do something. The Shadows could have done that – they weren't contracted to Vox and were only really using the amps because they'd been given their first ones free of charge. It was above board, no bribery, I should add – they were just given amps to see if they liked them. They did, and they used them. And when the model was superseded or bands were finished with them, they were taken back by Vox.'

The AC30 was a 30W model with twin 12" speakers and EL84 output valves. Hank's amp was modified with a treble booster to provide a cleaner sound at high volume levels, and this model was later branded as the AC30 Top Boost.

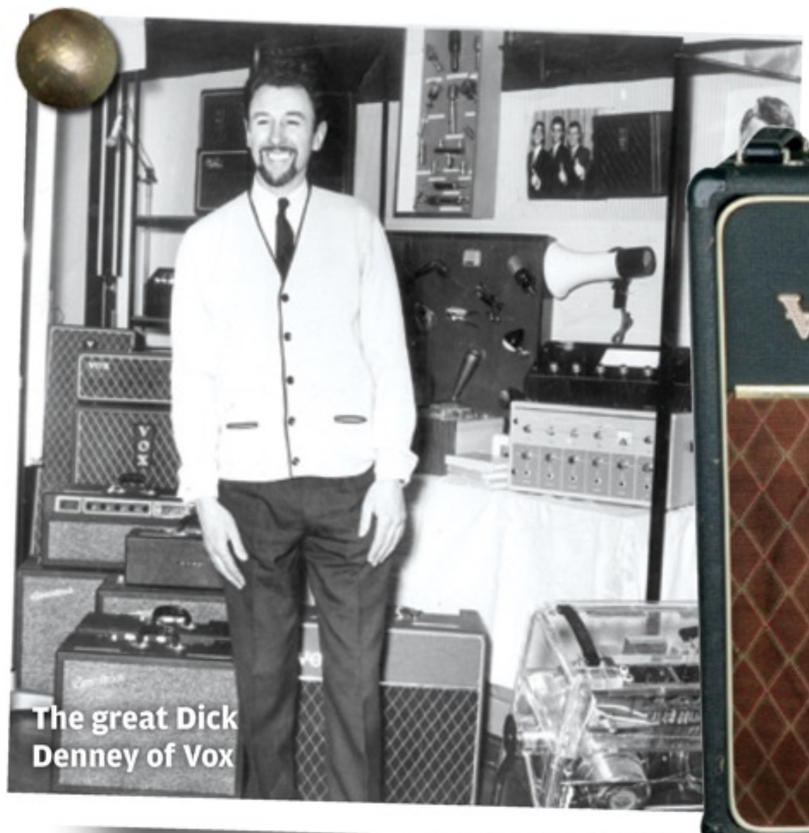
The Shadows were never really 'British Invasion' stars – *Livin' Doll* had snuck in to #30 in the US in '59, but as Cliff Richard And The Drifters. But Marvin's men were hugely influential in their homeland, and before too long, any wannabe guitar star wanted to know what guitar – and amplifier – Hank played. ➔

1965
At the Who's request, Marshall start building their 100W stacks, with two 4x12" speaker cabinets

1967
Vox cease valve amp production. At California's Monterey festival, Jimi Hendrix plays through Marshall stacks, the Who's Pete Townshend uses (solid-state) Vox Super Beatles. The Who soon switch to Sound City (later called Hiwatt) amps. Laney Amplification founded

1968
Orange build their first amps. In 1969, Fleetwood Mac use Orange amps on their USA tour. Hiwatt-branded amps debut

1969-1970
Led Zeppelin's Jimmy Page starts playing custom-made Hiwatts. *Black Sabbath* album is released, with Tony Iommi using Laney amps


The great Dick Denney of Vox

'Sound of the longhairs'! A 1964 Vox AC30 combo

Vox meets the Beatles... and the Rolling Stones

Vox soon wooed the Beatles and... bingo. Like Hank Marvin and company, the Beatles had used Selmer amps early in their career, but switched to Vox AC15s, then AC30s. Why? Voxes sounded great, but the Fab Four, like the Shadows, also got their Voxes on what was called 'promotional loan'. Beatles manager Brian Epstein promised Vox that if his rising band – then 'broke', according to Epstein – were loaned the amps they needed, they would never use another brand. It also helped that Vox had a singular look.

'Epstein was very much about image,' recalls Petersen. 'He'd tried different clothes on the Beatles, and that sensibility extended to equipment – even the amps had to be a part of the Beatles' onstage image. They needed to look smart, and Vox helped make a good job of that.'

The Beatles did use other amp brands, occasionally, but when they exploded into a global phenomenon on TV and live, there were always Vox amps at the back. As teen screams got louder, the Beatles also demanded more power, sometimes with ad-hoc engineering.

The late Dick Denney told author Andy Babiuk in the book *Beatles Gear*, 'I made up the first Vox AC50 using an AC30 cabinet with two 12" speakers plus a "horn" speaker for more top end. The horn didn't fit, so I cut a hole for it in the back of the cabinet. I didn't have the time to make up a new cabinet, because we had to get [the Beatles] new amps. There was always a rush.'

The Vox/Beatles relationship culminated in the AC100 guitar head and cab (and similar for Paul McCartney, technically a modded T60), developed again specifically to suit John Lennon and George Harrison's volume needs for a frenzied crowd. The amp became known in the USA as the 'Super Beatle'. Notably, though, the Super Beatle amps were solid-state, not valve – Vox's USA operation was calling the shots.

But ever savvy, Vox had also previously got the Rolling Stones onboard. In '63-'64, Keith Richards and Brian Jones extensively used Vox AC30s – Jones was even playing a Vox 'Teardrop' guitar. Bill Wyman had Vox Foundation bass amps and, later, his own signature Wyman bass, plus the violin-shaped Vox Astro (as used in the *Rock And Roll Circus* film). Add the Hollies and the Animals, and by the mid-'60s, Vox was the amp sound of the British Invasion.

However, Jennings had sold the Vox name to a US franchise in 1964, and things began to change. David Petersen says, 'For a few years, the American perception of UK amps was purely Vox. But Vox stopped valve amp production completely around 1967. Bang. Vox USA were convinced Fender's move to solid-state amps was the way forward. That's when Vox lost the plot completely.

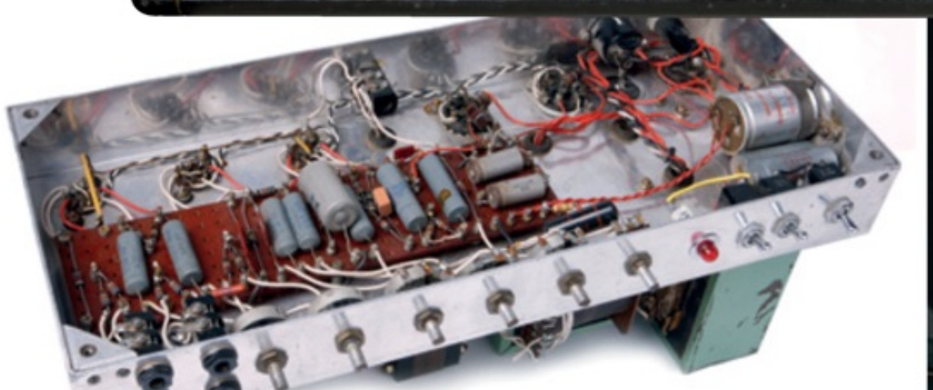
'Few people thought, at the time, that transistor amps couldn't be made to sound like valves. But musicians were very quick to realise the difference. That said, there were good transistor Voxes. Vox Super Beatles are still being used, notably by Tom Petty & The Heartbreakers and other '60s-inspired bands. But, by and large, US Voxes of that era are pretty dead-sounding things.'

Marshall lore

Even before they stumbled, Vox weren't the only rising British amp company. In 1962/'63, Dudley Craven, working with Dick Findlay and later Ken Bran, developed a new, Fender Bassman-influenced amp. Jim Marshall was a drummer – he already liked loud – and offered to sell the amps through his shop, later bringing the operation in-house. Marshall's earlier amplifiers were equipped with a pair of 6L6 valves, followed by 5881 and KT66 types. Initially, the amps were sold only as head cabinets, with optional matching speaker cabs sold separately. Many variations and head/combo set-ups followed over a short time as rock took over.

The most famous early combo, now, was the 2x12" Marshall JTM45 played by Eric Clapton when he was with John Mayall's Blues Breakers on the 'Beano' album. Marshall did themselves no favours with their nomenclature – many amp names are 'boring', but Marshall's were/are baffling. The amp Eric used was, technically, a Model 1961 which was essentially the lead version of the Model 1987 JTM45, made in 1964 or 1965. Marshall may not have had much marketing smarts – even now, you have to realise what you might be buying – but they had/have superb tone. Clapton's 'Beano' sound became legendary, yet it was, again, a perfect US/UK

Parks, Narbs and Marshalls: inside the Marshall museum



Top, early split-front JTM45; below and right, the '#1' prototype

marriage – some classic US blues songs, some 'UK blues' originals, all powered by a Kalamazoo-built Gibson Les Paul and the UK's own Marshall amps.

The Who were key to Marshall's amp development. Pete Townshend was an early user of Marshall's 50W JTM45, but he soon wanted more volume. Townshend went to Jim Marshall and asked for a four-valve 100W model. He also demanded a huge 8x12" speaker cabinet. Jim later recalled, 'I told Pete his roadies were going to kill him, but he said, "They get paid!"'

Marshall only made six of these 8x12" cab behemoths, four going to the Who and two to the Small Faces. Townshend used them for a while, before suggesting Marshall split the eight speakers into two 4x12" cabs. By 1965, at the Who's behest, Marshall were building the 1960A (angled-front top 4x12" cab) and 1960B (flat-front bottom 4x12" cab). The instantly recognisable Marshall stack we know today was born.

Typically, Townshend had changed amp allegiance by 1967. 'I tried Marshalls for a while because we always had a very friendly relationship with that firm but I never really used them. Everybody else did – Eric, Jimmy Page and Jeff [Beck], and Jimi Hendrix when he came over used Marshalls. I never got on with them. I don't know why.'

Jim meets Jimi

It was another artist who helped Marshall amps crack the USA: Jimi Hendrix. Based in London, Jimi was a regular visitor to the Marshall shop. Jim Marshall recalled, 'During the mid '60s a lot of well-known and up-and-coming guitarists used to visit me at my music shop in Hanwell, west London, but there's one particular visitor that I'll never forget. His name was James Marshall Hendrix and he quickly became the greatest ambassador my amplifiers have ever had.'

Jim loved Jimi. Jimi loved Jim. Amp 'druids' may even suggest it was all about the shared name, but Hendrix himself said, 'Meeting ↦

FORM VS FUNCTION

How the Vox and Marshall design philosophies differed

Of the early big brands of British guitar amps, Vox and Marshall ruled the roost. At first, the companies approached their designs very differently. David Petersen engineered for both companies in the '60s and beyond, and has an insider's view on why the original brands contrasted...

'Their designs were from opposite poles, really,' says Petersen. 'Vox amps revolved around style – a consistent look across the range. Vox were probably the first company where an external design came first: then, amp engineers would have to work out what you could fit inside it. A classic case in point is the Vox AC30. That design even drove the choice of output valves. Vox couldn't fit EL34 valves inside the design. It was a guy called Ian Duncan, from an outside design agency, who designed the look of Vox... and then you just had to cram everything in. It was form over function.

'Marshall, on the other hand, was very much a function-led design. Marshall had taken a Fender Bassman chassis and put the valves, shall we say, the right way up... instead of "bat hanging". And that was the JTM45. Designed from the inside out, rather than a Vox, which was outside-in. It made Marshalls much bigger.

'But, in my opinion, that's why Vox always looked much more elegant than Marshall. Even a Vox piggyback amp had a clear visual statement, between the two halves. That's why Brian Epstein liked Vox for the Beatles.'

1964 'Bluesbreaker' and the LP that gave it the name

'Marshall went over to EL34 valves because they couldn't get hold of enough 6L6s – but it gave the amps their own sound'

Jim was beyond groovy for me. It was such a relief to meet someone who knows and cares about sound. I love my Marshall amps. I am nothing without them.' Jimi generally used Marshall 1966 JTM45/100s and 1982A and 1982B cabs – see what we mean about those baffling names?

In a weird twist of British amp history, the Who and Hendrix were both booked to headline 1967's Monterey Pop festival. They tossed a coin to decide who would follow who. The Who 'won', as they didn't want to follow Jimi anyway: too much to live up to. But they 'lost' eventually, as Hendrix delivered a bravura performance – with a Strat-burning topping it all, and with Marshall amps there for all to see. Pete Townshend had by then stopped using Marshall amps: at Monterey, he played through a rented set of Vox Super Beatles. Why? Because by then the Who's backline was so massive, they couldn't afford to ship it around the world. Although the Who cemented their USA rep at Monterey, they sounded, to some, anaemic compared to Jimi. A British invasion? Kind of... but it was Seattle-born Hendrix who 'sold' Marshall amps to America.

One louder? One heavier?

By the late 1960s, British amps were a major business. Sound City wooed the Who, who changed gear with regularity. Sound City's L100 100W amplifiers were used by the band in 1968 – but the Sound City name was just a brand for the London store of the same name. The 'real' brand was perfectly titled: Hiwatt. Ever changing amps, Townshend was an early Hiwatt champion. Jimmy Page (who had his custom-built) and Pink Floyd's David Gilmour also play Hiwatts, even now.

In 1968, Orange debuted their visually unique designs, perfectly in tune with swinging London, and British makers were soon involved in a power battle. Marshall built the 200W 200 (which from '68 became known as the Marshall Major). Its nickname? The Pig. Deep Purple's Ritchie Blackmore was a regular user.

Orange/Matamp and Hiwatt also rolled out 200W heads. Hiwatt even had the DR405 400W bass head, with six KT88s and notoriously huge Partridge-designed transformers. Did all this Wattage make things twice, or four times, as loud? Not really. But such power did deliver clarity, punch and a brutal practicality.

David Petersen says, 'Dick Denney at Vox considered 30 Watts to be loud enough for anyone. But Watts became important, because bands had 1000 screaming girls and couldn't hear themselves. A good problem to have! But I should say that power is not as significant, to sound, as anyone might suppose. For example, a Vox AC15 is almost as loud, in dB, as an AC30.'

Then there was Laney. Birmingham's Lyndon Laney had rock connections – he was a bassist for The Band Of Joy featuring Robert Plant and John Bonham – but after he started building amps in his father's garage (from 1967), he soon had another Midlands maestro who would become synonymous with Laney backline: Black Sabbath's Tony Iommi.

Laney's valve amps didn't match the mega-Watt wallop of Hiwatt,

Laney's 1971 brochure and a Mk1 Supergroup head

UK VALVES VS US TUBES

How the 'British amp sound' was born of necessity

The sound of an amp is dependent on myriad factors: wood (in a combo or stack), wiring, speakers, transformers, capacitors, and so on. Amps are much more complicated than electric guitars, but the true 'amp-head' player tends to focus on the valves, and 'the British sound' of amps was, says David Petersen, possibly an accident.

'For a long time, it was hard to get hold of American valves in the UK,' he explains. 'The US military commandeered a lot for communications technology. You couldn't find American Sylvania, RCA or GE-branded tubes easily in Britain. That's why Marshall used the EL34s – European-produced, easily available and relatively cheap... although Marshall started with 5881s, used on the JTM45 that Pete Townshend used.

'But Clapton's "Beano" JTM45 was a funny one, as it used KT66s – a British copy of a 6L6. The 6L6 wasn't the whole reason for his sound, but it certainly contributed. American 6L6s and EL34s respond differently, but the reason Marshall went over to EL34s was because they couldn't get hold of enough 6L6s. So it was maybe an accident, in some ways. But it gave Marshall their own sound as opposed to a sub-Fender sound.'

The irony of it all? The classic American RCA 6L6 tube is a descendant of the 'Harries Valve', developed by British engineer J Owen Harries in 1935.

Marshall and Orange – they usually peaked at 100W – but the sound of *Black Sabbath* (1970) showed they certainly sounded heavier than hell. Indeed, as the '60s rolled into the '70s, British amps – and bands – were all over the world's stages. Fleetwood Mac had their Orange Matamps, the Who their Hiwatts, Free's Paul Kossoff his Oranges and Marshalls, Jimmy Page his Oranges, Hiwatts, Voxes, Marshalls and Selmers, Tony Iommi his Laneys, and so on. British-made guitars were rarely seen, but British amps had seemingly conquered rock. It endured, too. That classic EVH snarl of *Van Halen I* (1978)? It's a Marshall 2203 amp.

Still loud and proud

The British amp allure hasn't faded. In the modern hard rock/metal arena, Slash and Zakk Wylde are just two 'up-to-11' Americans dedicated to their Marshall tone. Wylde reckons: 'What does a Marshall sound like? Strength, warmth, commitment, beauty and destruction. All wrapped in a giant f***ing wrecking ball!' We'll take that as a recommendation, Mr Wylde.

More than 40 years on, Tony Iommi is still collaborating with Laney on signature-wired valve amps. Noel Gallagher blends Vox, Orange and Marshall tones. Yet the industry has certainly changed. Vox struggled in the '70s and '80s and are now owned by Japan's Korg Corporation – making amps in Vietnam and China, not in Dartford. Hiwatt faded too – for a while it was just a 'brand' – but since 2013 Hiwatt amps are wholly British-owned and built.

Newer guitar stars still can't get enough of the 'British sound', however you define it. Noted tonehound Joe Bonamassa has scores of amps – classic Fenders, rare '90s Dumbles – alongside his 270-plus guitars. But his Marshall Silver Jubilee series 2555 100W head, from the late '80s, is his key to the blues-rock highway.

'The Jubilee is always on,' Bonamassa confirmed when paying tribute to the late Jim Marshall. 'It's the base of the sound. Marshall has defined the sound of so many guitar players. They're still made in the UK and they want to keep it that way. And that's such a testament to the Marshall family in these times.'

Sound City head, the classic underdog, plus a 1972 Hiwatt AP200

Yet not even the 'same' British amp will always give you a uniform sound. You couldn't imagine two more different guitar stylists than Queen's Brian May and U2's The Edge, but they have one thing in common – vintage Vox AC30s, from '63 and '64 respectively. As the Irishman's tech Dallas Schoo remarks, 'That Vox AC30 is probably more important to Edge than any guitar.'

1973 Orange reverb unit

The British amp legacy

Maybe UK amp makers excelled – and do to this day – because they specialised. Fender, Gibson, Gretsch and others in the USA made guitars as well as amps; in the UK, Vox sold Vox-branded guitars, but at heart they were amp makers. Marshall, Hiwatt, Orange, Laney and the rest didn't bother with things they didn't really know. These famed British firms were/are all about amps.

And the legacy continues to this day. Smaller companies such as Hayden, Lazy J and many others continue in the UK to try to perfect the ultimate amp. The message seems to be – if you want loud, want tone and want style, then you want to buy British.

Thanks to David Petersen, co-author (with the late Dick Denney) of The Vox Story.

DEFINING THE BRITISH AMP SOUND: U-CURVES AND BELL-CURVES

It's strange, but most players will have an opinion on whether an amp sounds 'American' or 'British'. Over the years, many brands have evolved to blur lines, but David Petersen has a theory on the early demarcation.

'It's complex, and incredibly hard to define, as your readers will know!' he laughs. 'But, to me, the classic American sound is predicated 90 per cent on the clean part of the amp's spectrum. Classic American amps, like Fenders, tend to be used in a non-overdriven context. There are many exceptions, of course, but Fenders tended to be used for clean playing. Classic British amps go into distortion earlier, and the sound is more middle-heavy, as it were.

'Middle-heavy amps don't sound as good clean. The side-effect of that is a classic British amp will overdrive much more satisfactorily. Overdrive a classic Fender and it sounds harsh and flappy, or fizzy... and overdrive in the bass and treble sounds horrible. Overdrive is down the middle, as on a Marshall, and it sounds more musical, more sustained. The speaker's not so stressed.

'To visualise this, a Fender amp's response has a sonic "U-curve". Fender amps are engineered that way – you just can't get it out. That's why a lot of players use pedals like Ibanez Tube Screamers with Fender amps – it puts the middle back into the sound.

'In contrast, a British amp's response has more of a "bell curve". With a bell curve response, it goes up in the middle when you push the amp. For that Hendrix-y overdriven sound, that's why British amplifiers are much preferred.'

CHOOSING YOUR Ideal Amp

Digital modelling is all very well, but sometimes you need the real thing: pure, analogue, loud. So... head or combo? Solid-state, valve or hybrid? FX loop, channel-switching? *G&B* guides you through the backline jungle

Play the rock anthem of your choice on an unamplified nylon-strung guitar. Sounds pants, doesn't it? That's why we need amps and their associated paraphernalia: overdrive channels, contour controls, bright switches, FX loops, footswitches, reverb trays, vintage-voiced speakers and all that. Whether we hanker for clean twang, chunksome rhythm, wiry fuzz or supra-buzzy twiddledom, the amp is what gives an electric guitar its distinctive voice and thus its public 'face'.

Choosing an amp, then, is about arming yourself with the equipment that's right for your music, while being realistic about practical matters such as size, weight and volume. After all, you don't need a 100W stack for the local folk club and the odd spot of home recording. Conversely, you'll cut no ice at your first showcase gig with a groaning and wheezing 5W practice box.

In this guide we take you through the possibilities, so you can make an informed choice before parting with your cash. The main thrust concerns amps for electric guitar – and we're mostly limiting ourselves to the relative simplicity of analogue amps, rather than digital modelling devices. There's also a section at the end devoted to acoustic amps, a rather different breed.

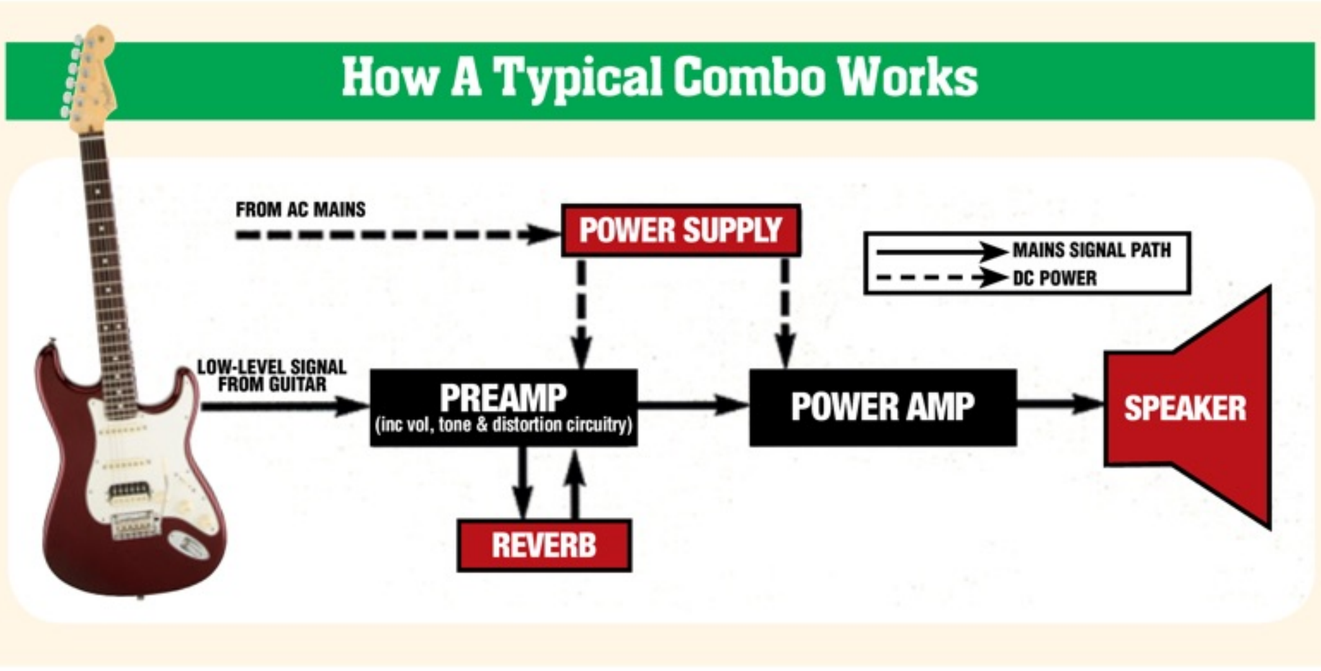
Fender's current reissue of the low-powered but stunning-sounding '65 Princeton Reverb...

...and at the other end of the loudness scale, the classic – but very hefty – Fender Twin Reverb

COMBO OR HEAD & CAB?

Browse around any music shop, or ogle the backline of any of your favourite bands, and you'll realise you have a fundamental choice: combo or stack. In a **combo** ('combination' amp), the electronics and the speakers are housed in the same cabinet; in a **stack** or **piggyback** set-up the electronics are housed in their own cab (the **head**), sitting on top of a separate **speaker cabinet**. The latter often used to be the familiar 4x12", a large **closed-back cab** sporting four 12" speakers, but smaller cabs with two speakers or even just one are becoming more popular – they're a lot more portable, and better PAs mean you don't need so much air-shifting power on stage these days.

Among combos, you'll see everything from 8W practice amps with a single 6" speaker through to gig-friendly 1x12" 20-watters – enough for everyman gigs and still easy to transport – up to chunky 2x12"s or vintage-style 1x15" or 4x10" models. All these will usually have an **open-back cab** to help disperse the sound and give characterful midrange, whereas a **full stack** (sporting two 4x12"s) will project the sound further and form an impressive backdrop for bigger gigs. A good compromise is to



The Vox AC30, generally considered the ultimate amp for 'British' chime and crunch

Orange's Crush CR60C: a low-cost solid-state option from a giant of valve amplification

A Marshall head on two 4x12" speaker cabinets: the old-fashioned full stack

add an **extension cab** to your regular combo for bigger gigs; if this sounds useful, check that the combo in question has an extension speaker outlet.

In a typical combo all the electronics are housed in an enclosed metal **chassis** at the top of the chipboard or plywood cab; the speakers are mounted on a vertical or gently angled **baffle** (in thick chipboard or plywood) and protected by a cloth or metal **grille**.

The **control panel** – carrying all the main rotary controls (potentiometers, or 'pots' for short), switches and inputs – may be **top-mounted** (in '50s style) or **front-mounted** (in modern 'backline' style). The cab might have a **vinyl**, **tweed** (linen) or even, albeit rarely, **carpet** covering.

In technical terms, it's the **preamp** that generally sports most of the knobs, allowing you to alter the tone via the **EQ** (equalisation) section, to adjust the volume, add distortion, and add any in-built effects such as spring reverb or tremolo, as well as perhaps incorporating your own external time-based effects units – echo, delay, chorus, flanging and the like – via an **FX loop**.

The **power amp** or **output stage** simply magnifies the preamp's signal so that the speaker can be driven effectively (see block diagram above). Although it sports few – if any – controls, the power amp affects how the amp as a whole sounds at volume.

Even before the advent of digital modelling in the '90s, designers put a lot of effort into creating affordable **solid-state** (ie: completely transistorised) and **hybrid** (part valve, part transistor) amps to mimic the dynamics and fat-sounding distortion of classic **all-valve** (or all-tube) models.

There's more about valve and transistor technology later in this guide; the main thing is not get obsessed with some 'right answer', but to keep an open mind.

SOUNDS FOR YOUR POUNDS

So what are we all here for, amp-wise? At least three things, probably: twangy clean tones (maybe with reverb), crunchy distortion for rocky rhythm or raunchy blues, and high-gain lead for the ultimate in compression, sustain and rich harmonic content – perfect for searing lead guitar.

Once upon a time, clean was what you got when you played quietly, crunchy overdrive was what you got when you turned the volume up for gigs, and richly distorted lead with endless sustain was what you got when you put a fuzzbox 'twixt guitar and amp. That's still the case with some great low-powered combos, but now you can have all three sounds in one amp, at any volume – without any extra gubbins – thanks to **channel switching**.

Today, even a lot of practice amps boast switchable high-gain overdrive. The idea is that you can switch from the clean channel to the lead channel (or overdrive setting) for your big solo, then back again. ➔

Some of our favourite combos of recent years (left to right): Blackstar Artisan 15, Fender '59 Bassman, Marshall Bluesbreaker, Yerasov GTA-15

The four-channel Dual Rectifier Roadster head from Mesa/Boogie, pioneers of channel-switching

With footswitchable channels, you can do this via a remote **footswitch** while still playing. Marvellous... but just check if the footswitch is included in the price.

Some better-specified amps have a 'crunch' switch on the first channel, so you can keep clean tones really clean or let it get just a bit hairy. **Three-channel** amps boast separate clean, crunch and lead channels, although some experienced players still prefer to set up one good basic sound (on a simple amp with a low knob count), then obtain variation by manipulating the guitar controls.

In terms of **output power**, guitar amps range from 10W or less to 100W or more. Traditionally, you'd reckon modest gigs would call for at least a 30W valve amp (maybe 50W or 60W for a solid-state, as valve Watts sound a lot louder). But modern PAs are a lot better than they used to be – and an amp with a **DI/recording output** will allow a good-sounding version of your signal to be sent direct to the PA, so in many cases you could opt for a 10W or 20W combo – a high-class one to give excellent tone, but small enough for its output stage to be pushed into overdrive at modest volume, relying on the PA to get your sound out front in quantity. Here are some key tips:

- Try to identity the format and output power appropriate to your musical style, ambitions... and mode of transport.
- Even if your budget is tight, don't feel obliged to accept boring or wimpy sound; the best 15W practice amps can still sound terrific for the money.
- Don't get too hung up on technobabble; use your ears to decide what's best.

DISTORTION RULES, OK?

From the Who to Nirvana, via Hendrix and Van Halen, controllable distortion is a vital part of tasty electric guitar playing. If we can arrange for certain parts of the amp's circuitry to be overdriven by our guitar signal in just the right way, then useful overtones (so-called '**even harmonics**') will be added to the signal, enriching the timbre and making each note last longer.

In a modern amp the key to this is the **master volume control**, combined with the separate **preamp gain control**. You use the gain control to determine how clean or distorted you want the preamp signal to be, then adjust the master volume to set the physical volume level required. For super-clean stuff, keep the preamp gain low, as shown in the diagram opposite; for mild crunch or bluesy overdrive, set the gain perhaps halfway and adjust the master to taste; for fully saturated, full-on rock lead, max the gain and keep the master well down to prevent overbearing sound levels.

On simpler one-channel amps, you'll get a gain and master volume to twiddle. Some amps add a second preamp gain control – try setting gain 1 high and gain 2 low, and vice versa, as well as both on full. Other amps provide an overdrive switch: push the button for instant heavy distortion.

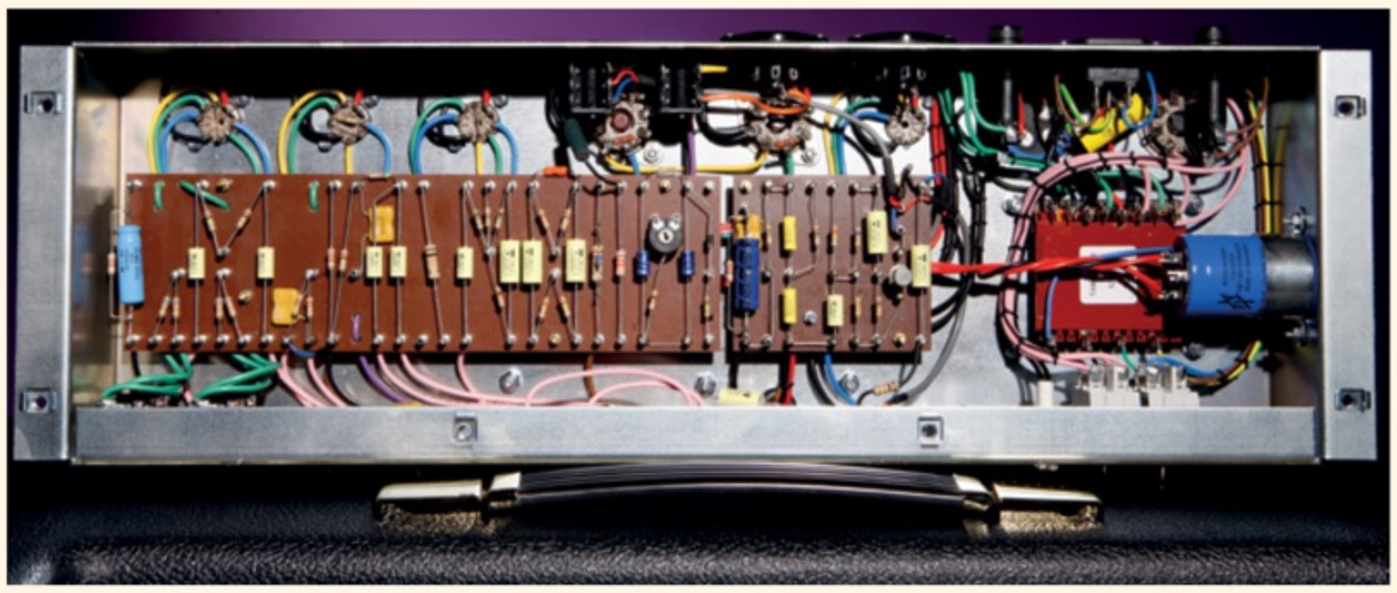
The next level of complexity – a very popular format – gives you separate clean and lead channels, each having their own gain control, with automatically more gain on the lead channel. Now other possibilities arise: the master volume may be replaced by

TECHNOLOGY AND POWER

There are two basic technologies in guitar amplification: **valve** and **solid-state**. Valves (or tubes) date back to the early days of amplification, and consist of metal elements sealed in an evacuated glass tube. A finely wound heater wire heats up one of the electrodes (the cathode) to prime the conduction process; it's this brightly-glowing heater that gives working valves their characteristic orange glow.

Preamp valves (like the common ECC83, aka 12AX7) are physically small, with two **triode** stages built into each glass envelope. **Power valves** (or output valves) are larger and usually work in pairs, driving the speaker via an output transformer (a bulky component that adds to the weight and cost of valve amps). There are many kinds of output valves in production nowadays, but the ones you'll come across most often are likely to be the relatively skinny EL84 and 6V6 and the chunkier EL34 and 6L6.

Solid-state devices – which work based on the electrical properties of small slivers of semiconductor materials, principally silicon – first came into common use back in the '60s. **discrete signal transistors**, **power transistors** and **integrated circuits** (ICs or silicon 'chips') are all variations on this theme: miniature, lightweight components requiring only low-voltage power (typically 15V to 25V, as opposed to the 200V or more of a valve circuit).



This hand-wired Marshall has components soldered to a turret board – no printed circuitry here

Despite initial optimism, it took decades for solid-state guitar amps to approach the sonic delights of the best valve amps. A good valve amp overloads in a guitar-friendly, progressive way, adding extra harmonics, whereas bog-standard solid-state circuitry stays clean until pushed hard... then overloads crudely. Designers have worked hard to develop valve-type responsiveness and tasty, controllable distortion in solid-state amps, and the best such designs are now very good indeed.

In the last decade or so, a whole new technology has emerged that comes close to combining the convenience of solid-state with the juicy tones of valve: **digital modelling amps**. These use algorithms to emulate the sonic characteristics of classic amplifiers – and the best ones can offer a taste of many vintage and modern amps, both British and American, at the turn of a selector switch. Modelling amps are increasingly popular, and Chinese mass manufacturing means they don't have to be expensive. Pioneered by **Line 6**, the

The feisty 15W Orange Tiny Terror head launched the age of the 'lunchbox' valve amp

a channel volume or channel master on each channel, so that each now has its own gain *and* master, for greater independence.

Two sets of tone controls (as opposed to one set, shared between channels) take this idea further, but shared EQ needn't be a problem: if the channel voicing has been designed well, you'll automatically get a fatter, fuller, more sustaining sound on the lead channel. Check that on lead settings your bridge pickup sounds pokey, not just bright, and give those flutey neck pickup settings a spin.

Three-channel amps often sport two sets of EQ controls, and again the voicing should ensure you automatically get into the right tonal area on all three selections.

Other amp distortion options include a switchable 'lead' mode, a gain boost and a 'fat' switch. Volume boost (or solo boost)

Using gain and master volume on a single channel amp

usually involves an increase in volume without any change in actual distortion texture. It's handy if these facilities are footswitchable, but once again some players will be happy with a simpler amp; the DIY approach involves setting up a heavy distortion sound and easing back the guitar's volume control whenever a cleaner sound is needed. Either way, the amp should give touch-responsive distortion at all but the

Peavey's Bandit combos have been a popular solid-state option for many years now

most compressed mega-gain settings. Hit the strings harder for more distortion; ease off for a cleaner sound.

Note that some of today's small, recording-friendly valve amps keep to a simple one-volume-knob, one-tone-knob arrangement. Although these amps don't have master volume, their volume control is sometimes dual-action, altering preamp gain as well as output volume. Result: classic simplicity, but with raunchy overdrive at civilised volumes.

Of course, after you've twiddled all the knobs and pushed all the buttons, make sure you feel at home with the distortion flavours on offer. One player's 'harsh' may be another player's 'lively'; one person's 'full-bodied ➔

technology has most recently been taken up by **Kemper** with its 'profiling' amps – and many traditional amp builders have now embraced the digital option, including Vox and Peavey. Some even combine modelling with real valves.

This brings us to another solution: the **hybrid** amp, with a single ECC83 in the **front end** (preamp) of an otherwise solid-state amp for 'real valve dynamics', 'true tube tone' etc. Conversely, that expensive modern all-valve amp may well use ICs for various jobs in the preamp stages, plus solid-state diodes or LEDs to shape the distortion waveform. For these reasons, it's not really what lies beneath the hood that's important so much as how the thing actually drives.

Most amps these days have their circuitry built onto a **PCB** (printed circuit board), although a few trad-minded firms build high-class valve amps with **hand-wiring** where everything is soldered without PCBs. Small valve amps of a vintage hue may opt for a **Class A** power stage, as opposed to the common **Class AB** arrangement. Class A is a hot-running and rather inefficient way of doing things, but gives crunchy, responsive distortion at relatively low volumes. In the same way, some valve

A reissue Supro with printed circuit board: the easier, cheaper option for manufacturers

This all-valve Blackstar has EL84s in the power amp (left) and 12AX7s in the preamp

amps use an old-fashioned **rectifier valve** in the power supply instead of solid-state diodes, to give a slightly compressed feel.

The most common way of expressing **output power** is in **Watts RMS**. 'RMS' stands for 'Root Mean Square', which is a measure of continuous power, rather than some optimistic 'instantaneous peak power' figure. Solid-state amps may boast generous power figures for their size, weight and price, but remember that a good valve amp will still sound dynamic at (or past) its rated output, at which point a solid-state model may be struggling.

On a practical note, some amps still have a captive mains lead (permanently attached), but many now use a kettle-style detachable lead. Also note that all new amps now have to be **CE-certified**, proving that they meet agreed European standards on electrical interference. You'll see a CE mark or sticker on the chassis somewhere.

- The power amp plays an important role in getting a grown-up sound, so test amps with less preamp gain and more physical volume, as well as simply setting the preamp gain on 10 for full saturation.
- If you opt for an all-valve amp, allow for the cost of re-valving (and possibly re-biasing by a service engineer) after a year's hard use. The preamp tube in a typical hybrid should last several years.

Line 6 ushered in the era of digital modelling with ultra-versatile combos like this Spider

and satisfying' another's 'smooth and boring'. Crank it and see! Here are some more important tips:

- Do you really need footswitchable sounds, or would one really good sound cover all your needs? If money's tight, a distortion or overdrive pedal could act as your third channel – try a few (there are plenty!) and see.
- Check whether an amp can create good in-between sounds – from mild crunch to medium overdrive – as well as the extremes of clean and filthy. The extra versatility might save you from having to trade up your amp as your tastes change.

TONE QUEST

The word 'tone' can have two distinct meanings in guitar amplification. Firstly, there's the simple issue of adjusting the tonal balance of your sound – less bass, more treble etc – via the **tone controls** (EQ). Single-coil and humbucking pickups may call for quite different EQ settings, and the way you set your midrange can have quite an influence on the distortion sound. Boosting the mids will give the kind of clonking tone favoured by many a '70s rocker; 'scoop' them out and you'll have yerself a typical modern thrash/metal sound.

Secondly there's the more nebulous issue of just how juicy a player's sound is, often referred to as **guitar tone**. When someone says, 'This Les Paul guitar through a Marshall amp gives a fantastic tone', they're talking about something that's affected by the pickups; the wood, the speakers, the amp's output stage and preamp voicing, plus the player's actual technique. It's still 'tone', but unfortunately this can't be simply dialled in with a quick tweak of the amp's tone pots. If only everything in life was that simple!

The most common arrangement for tone controls is a **three-band passive EQ**, with the frequency spectrum split into three bands, typically treble, middle (midrange) and bass. 'Passive' means that each control can only cut (filter out) the relevant frequencies; it can't boost them. Passive controls are interactive (each control affects the others) and they are often quite modest in their action, as well as electronically simple; this suits the guitar well, altering the instrument's final voice without any risk of silly, unmusical extremes.

Active (cut or boost) controls, on the other hand, let you completely re-shape the sound in seconds – try both. **Presence** helps your guitar to cut through by giving the sound a boost in the high-mid/lower-treble range – usually acting on all channels. A clean-channel **bright switch** gives more leeway when there's shared EQ, as does a **mid-shift** or **tone shift**, while a lead-channel **contour** control boosts the midrange powerfully when turned one way, and cuts it drastically when turned the other: from '60s to '90s, fusion to thrash, in a trice.

- If possible, use your own guitar (or at least a similar one) when auditioning an amp. Does the guitar's character come through, or does the amp make it sound rather anonymous?

If you have a very specific sound in mind a signature amp could be for you. This Laney Tony Iommi TI100 guarantees instant 'Sabbath tones

SPEAKERS CORNER

Speakers in amps can always be changed if you don't like them, but it's best to know your stuff before you buy. The typical guitar speaker consists of a stiff **paper cone** driven by the movement of a **voice coil** within a strong magnetic field, this field being produced by a large **ceramic magnet** (although a lot of vintage reissues use **alnico magnets**). The **frame** of the speaker (also known as the **chassis** or **basket**) will be made of pressed steel.

The most familiar name in guitar speakers is arguably UK company **Celestion**, although **Eminence** (from the US) and **Fane** (UK) also supply plenty of drivers, while amp makers including **Peavey** and **Orange** build their own. Nowadays you also have the option of the reissue **Jensen** speakers, as well as smaller but highly rated brands such as **Tayden** (UK) and **Weber** (US).

Changing speakers on your combo or cab can help you fine-tune your sound in terms of sonic 'fingerprint': some varieties go all-out to create warm, rich, vintage-style tone with open-sounding midrange, while others (like the Celestion G12T-75, often used in 4x12" cabs) plump for a more modern character, emphasising bassy thump and ringing treble, with a slightly compressed midrange. This up-front style guarantees clarity even when using lots of effects and heavy distortion, although most combo manufacturers favour a good all-round solution. For some, the Holy Grail is a speaker that sounds equally at home on classy clean tones, classic rock distortion and contemporary high-gain lead, with or without effects. Good luck!

Speakers: they speak for themselves

■ Experiment with the amp's tone controls across their whole range. For example, will treble and/or presence give cutting top end without harshness? Warmth without woolliness? Don't be afraid to set passive EQ controls at their extreme settings, if that gives the right sound.

■ Check out both **high- and low-sensitivity inputs**: the low will help to keep clean tones sounding clean and tight with humbuckers, while high will help you get easy overdrive when using single-coils.

CAUSE AND EFFECTS

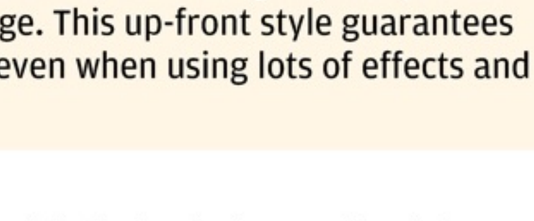
The most common built-in analogue effect is **spring reverb**, where part of your signal is converted to a mechanical vibration, sent down a set of long, wobbly springs to produce a spacious, echoey effect, then converted back to an electrical signal and mixed back in with your main (unaffected) signal. Usually there's just a single reverb control, altering how much of the wet (reverbed) signal is mixed in, although some might have a separate reverb level knob for each channel.

The other common effect, at least in old-school amps, is **tremolo** – which has actually been around since the 1940s. This gives a rhythmic pulsing effect by creating fluctuations in volume, while **vibrato** produces a similar but far fruitier effect with rhythmic changes in pitch – though some manufacturers use these two terms interchangeably. In either case, you'll get controls for **speed** (or rate) and **intensity** (or depth).

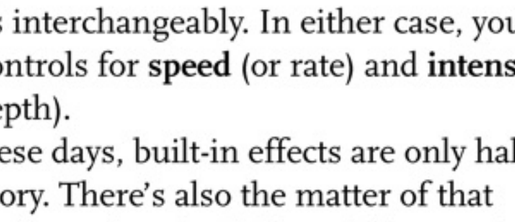
These days, built-in effects are only half the story. There's also the matter of that newer invention, the **FX loop**. This extra bit of preamp circuitry gives you a pair of jack sockets labelled 'send' and 'return', allowing you to place your time-based FX units in the most favourable position in the circuit for good sound and low background noise. The simplest arrangement is a **series loop**, where all your signal is sent through the loop. More sophisticated amps offer a **parallel loop**, where only some of your original signal is sent through the FX circuit (the exact proportion being determined by a mix control). This helps to preserve dynamics and tone. Because stompboxes work on instrument-level signals and rack-style FX units expect heftier line-level signals, some loops are equipped with a level switch or rotary level control. On a stereo amp, expect an FX loop with mono send and stereo return.

If you have favourite stompboxes or multi-FX units, take these along to the shop and make sure they interface with the amp properly.

Using 3-Band Equalisation



For vintage-style cleanliness or '90s ultra-metal lead keep bass and treble up, mids well down



For warm clean sounds or rock lead, keep bass and mids well up, treble backed off

SOCKET TO ME

Worthwhile 'extras' you might find on an amp's front/top or rear panel include an **extension speaker socket**, as discussed earlier; a **headphone socket** for private practice (plugging in here will automatically mute the amp's speaker outputs); and a **recording output** for sending a signal to the PA or mixing desk. A **line output** or **preamp output** also provides a line-level signal, but ●▸

a proper recording output is **frequency compensated** (ie: filtered) so that clean tones sound authentic rather than hi-fi-like, while lead tones come across as round-sounding rather than fizzy and unnaturally bright.

Speaker simulation (or emulation) circuitry is the key here. Speakers play an important role in shaping the tonal response of a guitar amp, so when they are removed from the sound chain – as with a **DI** (direct inject) signal – the sound has to be 'doctored' before it leaves the amp to compensate (though you may be able to EQ the signal at the mixing desk for a similar result). The DI socket may be of the three-pin **XLR** type; this is a pro format for sending a balanced signal to other gear via a special cable.

Less common extras are twin master volumes (usually footswitchable) for a preset change in output level, a half-power switch for the output stage of a valve amp, and a speaker damping control for a tighter or looser dynamic feel. And a lot of modern practice amps sport an MP3 input, so you can jam along with your favourite tracks.

Features such as a presence control, half-power switch or extension speaker socket may not seem very exciting when you're auditioning amps, but you might well appreciate them if you land a few gigs.

Fishman's aptly named Loudbox amps have made it a major player in the acoustic market

ACOUSTIC AMPS

Acoustic guitar amps often have multiple inputs, so you can plug in two instruments, or use a guitar and vocal mic, or a mic and a transducer on the same guitar.

The rotary **EQ** will provide gentle tone-shaping (useful on an instrument with no on-board controls), often complemented by a **shape** or **contour** switch for instant acoustic 'body' and 'sparkle' via a midrange cut. Or there might be a **parametric** mids control, with adjustable centre frequency.

Alternatively, some models feature a full **graphic equaliser**, giving cut-or-boost control over five or so frequency bands; go easy with the boost, or you'll undo all the designer's good work! The EQ's other task is to tame annoying feedback caused by the guitar's wooden top picking up sound from the speakers; a **feedback filter** is a sweepable notch filter, which lets you remove a narrow band of frequencies without decimating the tone or body of the sound.

Acoustic amps are invariably solid-state. They usually have an **input gain** control and **peak LED**, to help you avoid distortion and minimise background noise. The preamp will be able to accommodate both **active** (preamp-equipped) and **passive** guitars (with a simple piezo transducer).

When trying them out, look for crisp but open-sounding top end, detailed midrange and full-sounding bass without woolliness or constant feedback problems. Beware a faint 'boxiness' that you just can't seem to dial out. It should also be possible to warm up the bass end without swamping the midrange or losing the low-string detail.

With an acoustic amp, the character of your instrument should come through clearly in the amplified sound. Listen for any loss of clarity or tone as you turn up the amp volume; if it makes you wince when you hit the strings hard, move on.

Don't be surprised if the best-sounding acoustic amp you find is smaller than the competition – we're talking tonal finesse and unexaggerated sound here, not floor-shakin' 4x12" machismo. That said, some firms make sure that their acoustic amps are also capable of meaty dynamics, so that rockers delivering a mid-set acoustic strum will still feel at home. Turn up the volume and check how effective the anti-feedback measures are. Will one tweak kill the problem, or will you end up with your back to the audience for five minutes?

Of course they're all looking at you, not your amp... but that doesn't mean all amps have to be black

PRACTICAL MATTERS

Hopefully, we've helped you to focus your mind on what you already really knew – your final choice of amp will take account of a lot

These extra-tweakable Peavey ValveKings have almost as much going on round the back as on the front panel

The Yamaha THR10, a practice amp with stereo speakers and a high-quality line-in for playing along with MP3s

more than the obvious, such as looks, distortion quality, power and price. For instance, retro-flavoured designs are currently all the rage, but will an amp with vintage-style top-mounted control panel be as easy to use as one with front-mounted controls? A classy fabric grille cloth might look the business to you, but is it practical for your gigging needs?

If you're going to be playing live a lot, think about where and how often you're likely to travel. Are any valves well protected? Is there proper provision for stowing leads? Is the handle strong? Would castors be a real boon? What about a mains voltage selector switch, in case you're asked to play outside Europe with your own gear? And a full guarantee could be handy. Heck, does the amp balance properly when lifted? These things could come back to haunt you.

- Cosmetics may be a matter of taste, but they're also part of ergonomics. Will you be able to make quick, accurate adjustments in the heat of the moment?
- Think about practical details: footswitches, carrying handles, portability...

DECISION TIME

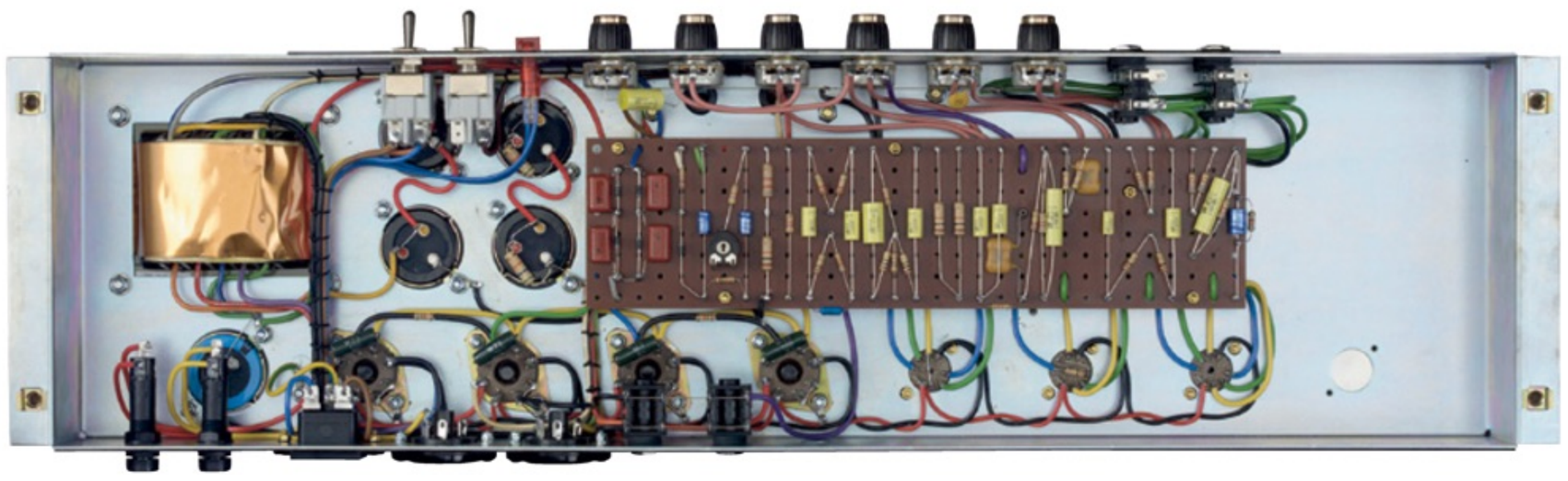
Ultimately, there's only one bit of advice that's going to be any use to you: identify your needs and desires, and buy whatever comes closest. Simple, eh? Try not to be swayed by what other people think unless they've got first-hand experience of the amp you're considering – 'other people' are not the ones forking out their hard-earned.

So when you do hit the shops, money in hand, try as many amps as you can without letting too many preconceptions come into play. Sure, we know you've always wanted that classically styled 50W half-stack but try that full-metal-racket 65W combo anyway – it might just rock your socks off.

Oh, and do us all a favour, eh? When you do get to the shops, don't even think about testing an amp with a quick flurry of *Smoke On The Water*, *Stairway To Heaven* or *Smells Like Teen Spirit*. There are so many good ways to test an amp... but having your head shoved through a 4x12" is definitely not one of them. Happy hunting.

Laney has also got in on the acoustic amp market; this is its A1+ combo

Marshall
JMP
OFF
ON
STANDBY
ON
INDICATOR
PRESENCE
BASS
MIDDLE
TREBLE
VOLUME I
VOLUME II
INPUTS
100
Marshall
Marshall
Marshall



MARSHALL 1959HW Handwired Super Lead 100 head & 1960 cab

With the Handwired Series, Marshall set out to recreate the sounds that first secured its reputation. So, in January 2006, **Dave Petersen** checked out a 100W head that would soon become a bit of a classic in its own right...

It's hard to imagine the rock guitar world without Marshall; they're virtually the same thing in many people's minds. Yet before the amp we're looking at was originally introduced, the name had no greater significance than many boutique amps have now – a curiosity, used mainly by mod and soul bands in London.

Then came the first Marshall 100W units, used by The Who and Jimi Hendrix in a kind of guitar supernova... but they were a little differently engineered to the standard production '68 'plexi' that forms the basis of this reissue. With EL34 valves, a robust steel chassis and more reasonable operating voltages, the model 1959 Super Lead 100 was a reliable commercial product without too much tonal sacrifice. This, rather than the hot-rodded Who/Hendrix unit, was the amp whose sales in the late '60s and early '70s made Marshall the biggest name in UK music products.

The 1959HW is externally very accurate, although some materials such as covering and inlaid linework are subtly different from its ancestor in texture or colour; important features such as panel material, knobs, switches and pilot lamp are, however, virtually indistinguishable. The small gold-on-white badge is perfect. There's a concession to current safety requirements in the use of an IEC connector (relief to all those who spend hours rooting about in surplus stores looking for Bulgin plugs for their old Marshalls), and the solidly made three-way switches for mains voltage and output impedance are more reliable-looking than the plug-in-socket selectors of the old plexi. All aspects of workmanship are faultless.

The 4x12" 1960BHW cabinet looks wonderful too. It's no lightweight, with those big G12H magnets, but the (supplied) castors are a boon and we lost no time in fitting them, after which the cab was a pussycat to handle. Then its looks took over, ➔

The sound of the original Super Lead 100 is part of the fabric of heavy rock, and this reissue renders it faultlessly

FACTFILE

MARSHALL 1959HW 100W

DESCRIPTION **Handwired 100W head. Made in the UK**

PRICE **Head £1399; 1960BHW 4x12" cabinet £599**

VALVES **Four JJ/Tesla EL34s, three JJ/Tesla ECC83s**

FRONT PANEL **Mains switch, standby switch, pilot lamp; Presence, Bass, Middle, Treble tone controls; Channel 1 and channel 2 Volume controls; channel 1 (normal) paired jack inputs; channel 2 (bright) paired jack inputs**

REAR PANEL **IEC mains connector, mains fuse, HT fuse, mains selector (110/220/240V); output selector (4, 8 or 16 Ohms). Paired output jacks**

CAB **IB straight-fronted cabinet fitted with four Celestion G12H speakers rated at 16 Ohms impedance and 120W RMS power capacity. Single jack connector. Castor set supplied**

DIMENSIONS **Amp: 74cm wide, 21cm deep, 28cm high. Cab: 76cm wide, 36cm deep, 76cm high**

WEIGHT **Amp 21kg (46lb), cab 40kg (88lb)**

CONTACT **Marshall 01908 375411 www.marshallamps.com**

The 1959HW's Dagnall transformer set is sourced from the original supplier for the '68 model

and all the happy old associations were soon firmly in place... with the strained back a distant memory.

Internally the amp is very much as you'd wish to find it. The work of reproducing the original 1968 circuit has been thorough, complete with perforated pax board and turret-tags for the main assembly, and handwired pots, sockets and switches. Resistors are decently fat (modern ones of the same thermal rating tend to be much smaller) and quality polypropylene caps are used for interstage coupling. The Dagnall transformer set is from the original supplier for the '68 model. Wiring is neatly executed in thickly insulated stranded equipment wire, as skilfully done as any original.

The cab benefits from the same approach, with its joinery in birch ply just as before. The back panel is 12mm, a touch thin by modern standards, but the solid central bracing post on the front panel prevents the worst of the 'flap out' that can arise from sympathetic vibration. The original plastic jack recess plate is fitted, which is good in terms of originality. The reality, however, is that these are fragile, with tugs on the speaker cable often resulting in fractures. The jack has been changed to a Switchcraft from the original Bulgin/Re-an pattern, which should help against the blowout problem that was common on the originals if a half-stack was driven hard. The combination foot/castor receptacles are solid, and the free set of castors a valuable accessory.

Sounds

The sound of the Super Lead 100 is such a part of the fabric of heavy rock that it doesn't need detailed description. The 1959HW renders it faultlessly, well supported by the use of a matched output valve set (which didn't happen in the 1960s, of course).

The '68 plexi voicing isn't as extremely different between the two channels as the later '70 to '72 voicing, which virtually obliged the player to link channels to get a useable tonal balance. Nonetheless it's strongly shaded, with the Normal channel relatively uncontoured and the Bright channel very twangy. The change in tone with the volume pot advanced on the Bright channel, which warms the sound as the amp begins to colour up, is also well preserved. Loud performance level is reached by 3 on the Bright channel volume control (after that, you're on 11). A common impression when you crank a plexi (that the volume stays the same, but the actual room changes size) is present and correct; the maximum available level is, you won't be surprised to hear, extreme.

The 1960BHW cab seems to have a complementary effect on the tone, with a warm elasticity in the low end and a silvery top end combining to create the impression of a 'U' contour. This helps to calm what could have been an aggressively mid-heavy tone balance. The result when playing a Strat is almost too contoured (but in an agreeable way, reminiscent of The Who's Rickenbacker/JTM100 sound circa '67) and needs Jimi-like skill with guitar switch and volume settings to get what you hear on *Hey Joe* or *Purple Haze*. With a Les Paul, however, there's a combination of warmth, edge and cut-through capability that conjures up Free, Cream and other great blues/rock outfits of the early '70s. This sound is printed into the way the amp and cab work together, and takes minimal effort to produce.

Verdict

The 1959HW/1960BHW combination is such a powerfully individual sound that it's tempting to think of it as suitable only for a particular kind of music – heavy blues/rock. It's true that, with its relatively simple layout and facilities, it will appeal chiefly to the 'plug it in, turn it up' player; but it's also important to acknowledge that this is how the classic sounds that sell records 30 years after they were made came about. There's a richness of tone here that has enduring appeal, as proved by the pressure Marshall has been under to recreate this classic combination. They've done it brilliantly, and quite affordably.

FINAL SCORE

MARSHALL 1959HW 100W	
Build quality	**19**/20
Versatility	**16**/20
Sound	**20**/20
Value for money	**17**/20
Vibe	**20**/20
TOTAL	**92%**

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or just plugged into an IRT-X

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- Volume
- USB Audio in/Out
- Reamp functionality
- DI/Line Out
- Hi/Lo Gain switch
- Bright Switch
- EQ preshape switch (No eq or IRT flat EQ)
- Loudspeaker Emulation Switch
- Headphones (3.5mm)
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- Supplied with power adapter

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TUBE Tasting

A Player's Guide: Preamp Valves

JUST AS DIFFERENT STRINGS OR PICKUPS WILL drastically alter the sound of your guitar, different makes of even the same type of valve can radically change your amp's tone and affect its reliability. Back in October 2000 British dealer and premier tube tester **Derek Rocco** of Watford Valves shared his taste tests with us...

Tubes are tubes, right? Sadly, no. Guitar amps may 'function' in the literal sense with an appropriate type from any manufacturer (though not for long in some cases), but because preamp and output valves really are at the centre of an amp's tone, the sound produced can alter beyond recognition from make to make.

In simple terms, valves available to buy today come from two distinct camps: current production examples, and 'New Old Stock' (NOS). The first are manufactured in factories that are still up and running, while the second batch consists of remaining stocks of valves which are still 'new' in the sense that they've never been used, but were manufactured long ago – sometimes as far back as the '50s.

Valve production in Western Europe and the USA ceased in the 1980s, by which time the technologies that supported it – mainly military and communications uses – had changed over from vacuum tube to solid state circuitry. Although valves were and still are used in better instrument amplifiers and some high-end audio, these markets just weren't enough to keep the high-cost factories running.

From that point onward, new valves have only been manufactured in China and Eastern Europe – including the Sovtek and Svetlana factories in Russia and JJ Tesla in Slovakia.

Fortunately, considerable supplies of generally superior NOS valves do remain, though they are ever dwindling – and if you've studied your economics, you'll already have guessed that the laws of supply and demand dictate that these desirable Western European and US-manufactured components will gradually command higher and higher prices as they sell out into extinction.

That's the reason you really need to know what you're paying for and why. In the tests below, we'll look at the most common and readily available current production preamp valves and a basket of still relatively easily found NOS examples, along with a couple fetching astronomical prices but worth considering as 'standards' – the legendary Mullard, for example.

The amplifiers used were a '70s Fender Twin Reverb fitted with JBLs, another '70s Fender Twin Reverb fitted with original Fender 'blue back' speakers, a Mesa/Boogie Mark IV combo, a Marshall 100 Super Lead into a 4x12" cab, an '80s Fender Princeton Reverb II and a vintage Vox AC10 with Elac speakers. The guitars used included a 1973 Fender Stratocaster, a 1980 Yamaha SA2000S semi-acoustic and a 1980 Gibson Les Paul Standard. Valves were selected for low microphony and low noise and rated for gain.

All of the valves below are of the 12AX7/ECC83 'double triode' type (12AX7 being the US designation, ECC83 the European). While you will find other valve types in some parts of guitar preamps, these are the most common 'first gain stage' choice and therefore have the most effect on your amp's drive and tone. Guide prices give an approximate range of prices commanded by each valve on today's market; for specific prices and availability, check with retailers in the 'Connections' sidebar over the page. Any letters or numbers following the manufacturer name (such as 'WA' or 'LPS') are their own sub-codes.

Mullard ECC83, Mullard M8137 Box anode, RCA 7025 and Telefunken ECC83 valves were used as the reference.

SYLVANIA

USA (NOS), guide price £30-£50

Classic American valve that was fitted by all the great '60s amplifier companies such as Ampeg, Fender and Gibson. This valve produces a rich, warm tone with excellent balance; when distorted it produces a fat sound with plenty of drive without any loss in top-end clarity. In the Fender amps the valve produces a clean, bright response which is great for fingerpicking. Single-coils sound full with no harshness and plenty of detail.

In the Boogie a sweet, crisp clean sound is easily attained, plus a classic rock sound with a little mid-forwardness (which we like). Because of the high-gain nature of the Boogie, however, it's important to select valves for low microphony.

Early '60s production – an ideal choice for all vintage Fenders.

GE-JAN (JOINT ARMY NAVY) WA

USA (NOS), guide price £50-£80

This rugged American military-spec valve is of immense quality – it's the same tube fitted as standard in '70s Fenders. The GE valve is famous for its big, crisp sound-stage and bright top-end response, something that really breathes life into Fenders. This valve supplies that authentic Fender twang; it's brighter than the other American valves and also works really well in the Vox by giving it a clearer treble response. When the valve distorts it has a rich harmonic feel and chime. Even under heavy Boogie distortion the bass and midrange detail are superb. Thoroughly recommended.

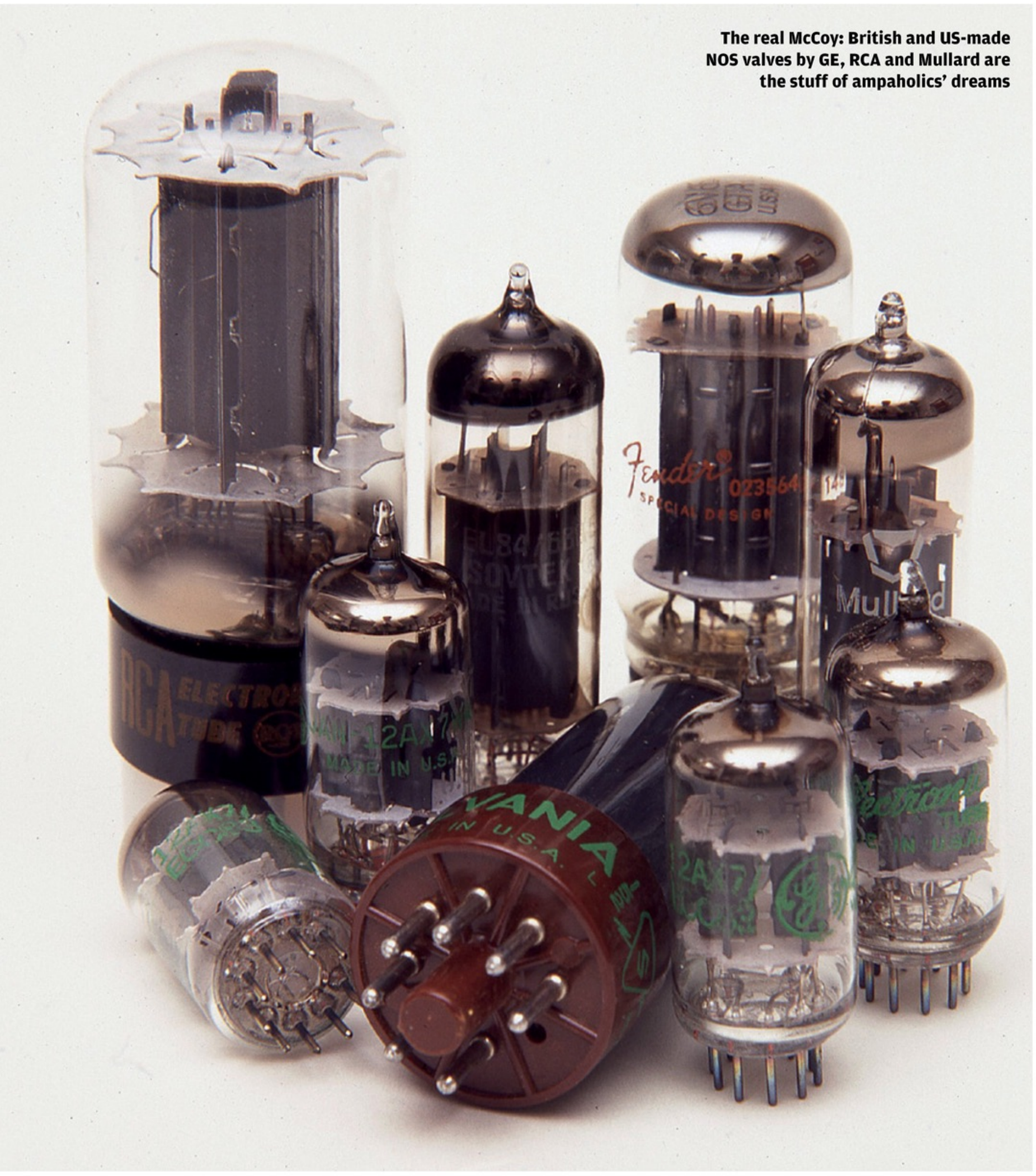
SOVTEK WA

Russia, guide price £8-£10

Low to medium gain with the same sound quality but less gain than the WB type below. When distorted, the WA doesn't have the detail or balance of NOS stuff – this valve seems to be pushing everything through the mid band. When pushed hard the sound compresses very early too. But it's good for general repairs.

SOVTEK WB

Russia, guide price £12-£18



The real McCoy: British and US-made NOS valves by GE, RCA and Mullard are the stuff of ampaholics' dreams

Sovtek's lower-gain 'WA'

A more desireable Sovtek 'WB'

Low to medium gain with low microphonics. This Sovtek has a clear, bright sound, although it lacks the clarity and definition of NOS valves, and it and distorts earlier than the WA. The sound is the same as the WA, but far better than a generic Chinese 12AX7 – no 'snap, crackle and pop'.

SOVTEK LPS

Russia, guide price £12-£18

This valve is of medium to high gain and has a special spiral filament that greatly reduces hum when operating in amplifiers with AC heaters. This is certainly the best 12AX7 that Sovtek have come up with.

In guitar amps we noticed that the level of microphonics was higher than the WB, but this would also be consistent with the higher gain of the tube. It gives a bright and clean sound, but not as sharp as the GE 5751 over the page. When distorted, it retains its control and sounds sweet. Overall this is a very good-sounding valve – a decent choice for audio or guitar.

PHILIPS-JAN WA

USA (NOS), guide price £40-£60

Low-noise American military valve made in the famous Sylvania plant in Emporium, Pennsylvania. It retains the classic warm, solid sound of the early Sylvania but has less drive. This proves useful in the Boogie as the lower gain of the valve gives less microphonics. Midrange is very musical with all the clarity of the Sylvania.

The bottom end is superb: in comparison with the Sylvania it sounds a little tighter and better-defined, which is welcome in the Marshall amps. The bass is not as deep as the Mullard but the Philips does have that instant British-style tone. In the Fender amps all the tone that you would expect is there. This is a superb valve and an instant upgrade for all modern amps.

MULLARD

GB (NOS), guide price £30-£50

This legendary British valve is the most sought-after ECC83/12AX7 of all time. The key is the way the valve distorts. The Mullard reproduces exactly what is driven into it with great musicality, combining smooth drive with balanced low microphonics, and reproduces every subtle detail with a rich sound-stage.

When overdriven the valve has a 3D effect that makes it really sing – and it sounds amazing in a Boogie. The noise level even at full saturation is very low, while the bass response has great kick without loss of

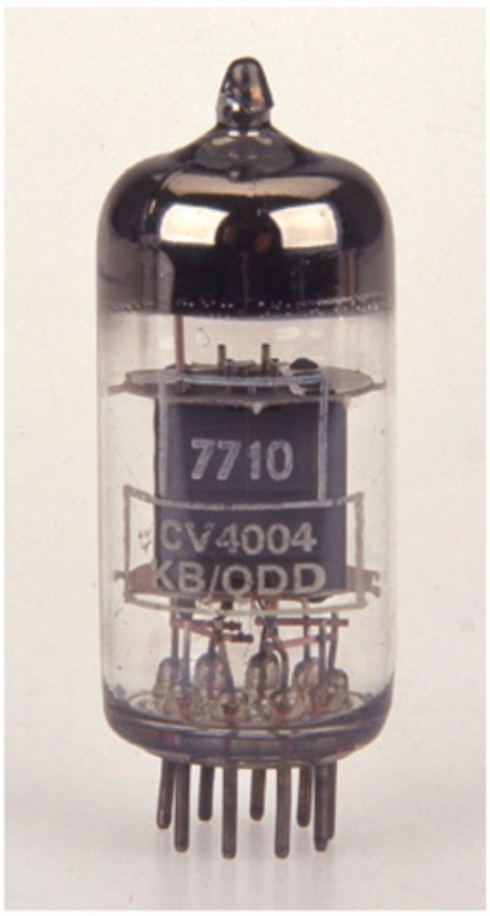
definition. We came to the conclusion that this was going to be a hard act to follow. (Note: this NOS valve is not to be confused with the modern Groove Tubes reissue, which is made in Russia.)

BRIMAR CV4004

GB (NOS), guide price £20-£50

A British military-spec valve with half-flange anode giving instant British rock. The Brimar has exceptional balance and sound-staging with great drive. It hasn't got the rich harmonic distortion or the unique 3D effect of the Mullard and under full distortion doesn't have the same bite, but the presentation is relaxed and musical, which none of the new ECC83 types can match. This valve does everything it should do excellently.

Mullard: king of preamp tubes



A military-grade Brimar CV4004

JJ TESLA

Slovakia, guide price £8-£12

This valve's gain characteristics place it in the medium-to-high-gain range. The low-end response is clean and clear; it has a solid structure that makes it free from adverse microphonics. Tonally, it's great. The midrange has a slight blurring which seems to increase the harder you push it, while the top end is sweet and clear and has nice sustain. Great for rock sounds, but not ideal for clean.

GE 5751

USA (NOS), guide price £40-50

This is a low-gain valve, which produces all the classic GE sound-stage and performance as described with the 12AX7WA version. It's very low in distortion and difficult to clip. This is an excellent valve for use in Fenders or any clean stage application, sounding bright and vibrant with plenty of detail. It's very well balanced – indeed it's very easy to get identically matched examples (where each of the twin triodes have identical characteristics). This

GENERIC [various brands]

China, guide price £5-10

Chinese 12AX7s have been fitted by all the major amp makers. On the plus side they have good gain and low microphonics, which suits the Boogie and the Marshall amps. The drawback? A complete lack of tone, giving the trademark 'wasp in a jam jar' cheap overdrive sound. The treble is fizzy and the bass response gives a hazy distortion. Also, after only short periods of gigging these valves tend to sound harsh and brittle. We can't recommend them.

valve is far better than any currently produced valve for clean, pure, Fender-style twang.

RFT
Former East Germany (NOS), guide price £8–£14

This German valve – used for a long period by Marshall – is sometimes branded Brimar, Siemens or Telefunken. It has a rich bass response, great drive and a clear and detailed midrange, and is very low in microphonics due to a thick glass envelope. This valve distorts earlier than the American types, but it shows less treble response – a characteristic that lends it to rock-style setups. The rich harmonic distortion, full of sustain with plenty of bass crunch, makes this a great valve in Marshall, Boogie and Vox amps. Definitely one for rockers and blues players.

GE's robust, low-gain 5751

Chinese 12AX7: not a favourite

THE VERDICT

The first thing to make clear is that, under these tests, the unanimous conclusion is that the NOS valves offer better sound quality than the current production types; but this has to be balanced against cost and what your own budget will allow. Tonality is in the ears of the listener and you might find that a current production item has exactly what you are looking for. So take our guidance as a starting point, then try as many valves as you can until you find the sound that suits you.

Having said that, the **Mullard** ECC83 is the clear winner, as its superb character shines through. The detail, sustain and perfect balance are second to none, but what really wins the day is its three-dimensional distortion character and bass bite.

Otherwise, it's a very close race for runner-up. The **RFT** has a great rock tone and Mullard-style gain; it can be made to distort very easily and is most at home in Marshall and Boogie amps. With bass crunch in abundance, this is an ideal valve for rock players. The **GE** is the most 'American'-sounding due to its bright nature. We love the sound-stage and crisp distortion of this valve, and it's certainly a great all-rounder with low microphony.

The **Sylvania** and **Philips** valves show a similar sound quality. The Sylvania has higher gain and higher drive: this could lead to feedback in critical early gain stages if the valves are unselected for microphony. The Philips seems to be tighter in the bass area but retains the classic mid-band warmth – and it sounds really good in Fender amps.

The **Brimar** CV4004 is a classic British-sounding valve. Refined and balanced, it does everything it should, and very well. Mind you, it's not as aggressive as the Mullard, the GE or the RFT.

Of the current production items, in terms or pure sound quality the **JJ Tesla** is the best. The current JJ valves (used heavily by Groove Tubes) are higher-gain than ones from the early production years. They generally have a good sound with a forward presentation, though when pushed really hard they can sound a little rough around the edges. The audio boys may not like this but it does sound pretty good in guitar amps.

The **Sovtek** valves are certainly low on microphonics – and that's why they're used by more amp manufacturers than any other valve. The WB and LPS are the best for guitar. The LPS seems to be cleaner and sharper than the other Sovteks, and what you lose in microphonics you get back double in terms of gain. This provides more crunch, more drive and more musical tone than any Sovtek valves before. Basically, the Sovteks do tend to suffer from a little midrange fuzz when pushed and they lack the midrange detail of NOS valves, but they offer excellent value for money and are available in good quantity.

The simple rule to remember is that all the valves do sound different and it may be the least expensive valve that meets your needs. Once you have found your preference, always get some spares because in life these three things are certain: death, taxes... and the fact that stocks of original vintage valves will dry up!

Further results and other tube types can be seen on the Watford Valves website: ***www.watfordvalves.com***

Connections

Valves are available from a number of established UK dealers, although prices vary according to the degree of testing and matching provided. Expect to pay a quid or two more for guaranteed tested preamp valves than from job-lot sellers; you'll have to decide for yourself whether the savings are worth the risk. As these tests show, many Eastern European valves in particular have occasionally high failure rates, and even hallowed US and UK-built valves can fail right out of the box.

Although many big valve dealers will rebrand units with their own logos (as done by Groove Tubes, Ruby Tubes, and Watford Valves' own Harma label), you should always have access to accurate information on the original model number and country of origin. As discussed in our feature, all current production valves will come from well-known lines built in a few established factories, while remaining supplies of NOS valves are generally only from familiar and traceable production runs – whatever new branding they've been given.

Many good guitar shops carry stocks of valves, but for specialist UK suppliers try the following:

Watford Valves
watfordvalves.com / 01923 893270

Langrex
langrex.co.uk / 01403 785600

Hot Rox UK
hotroxuk.com / 0115 987 3163

Chelmer Valve Company
chelmervalve.com / 01621 745450

PM Components
pmcomponents.co.uk / 01795 419450

Edicron
edicron.com / 01367 243030

Ordering from the USA will obviously incur higher shipping charges (and sometimes customs charges and VAT too), but there are plenty of dealers on the web. Here's a selection:

Angela Electronics **angela.com**

Kropotkin Classic Amplification
kcanostubes.com

The Tube Store **thetubestore.com**

Tube Depot **tubedepot.com**

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For a lively, tactile sound with natural distortion at manageable volumes, the guitar world is turning to the new breed of quality baby valve combos. In 2011 **Huw Price** examined six of the best

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CONTACT **Matamp 01484 859500**
www.matamp.co.uk

This is a sizeable amp. When we pulled this one out of the box we thought Matamp had sent a 30-Watter by mistake, but a quick grope under the chassis confirmed the presence of a single 6V6 power valve that pushes 4W through a 12" Celestion G12M Greenback. The top panel accommodates Reverb, Treble, Bass and Volume controls, and Matamp is keen to stress that this is a bona fide transformer-driven spring reverb with a dedicated ECC83 valve. There's also a line-out socket with a level control that can be used for recording via a speaker simulator. When recording you can unplug the speaker for silent operation because the Mini-Verb has a built-in dummy load. You can even use the amp as a standalone spring reverb when mixing.

Matamp says this is the cleanest-sounding amp in the Minimat range, but when pushed it does produce one of the sweetest and most refined overdrive tones we've heard in a long time. The Mini-Verb has a superbly clear and chimey treble that never gets harsh, and plenty of low-end oomph. It cleans up from the guitar superbly.

We found this amplifier was just as happy being pummelled by PAFs or tickled by a Telecaster, and the lush reverb comfortably supported the overall tone without overpowering it. Sonically speaking, you could place the Mini-Verb somewhere between a blackface Fender Champ and a Vox AC10. Obviously this amp wouldn't be ideal for heavy rock players, but for country or blues players and Travis pickers it's pure dripping honey with a woody clarity that underpins everything it does.

FINAL SCORE

MATAMP MINI-VERB	
Build quality	**18**/20
Versatility	**15**/20
Sound	**18**/20
Value for money	**18**/20
Vibe	**18**/20
TOTAL	**87%**

CARR
Mercury 12

8W, 1xEL34, 1x12"

PRICE **£1939**
CONTACT **Coda Music 01438 350815**
www.carramps.com

US maker Carr is famous for its no-compromise point-to-point wiring. Plenty claim the same, but physically connecting one component to the next – like Carr – is different to wiring them together on a turret or eyelet board. With its Coco Cream two-tone tolex, substantial leather handle and near-perfect finish, this amp oozes quality.

The extensive features list on this sizeable 1x12" combo includes an Eminence Red White & Blues speaker, Volume, Treble and Bass controls, and a four-position switch that drops the output from 8W to 2W, 1/2W and 1/10W. There's a three-way tone defeat switch that gradually removes the EQ circuit to morph from clean full frequencies to something more tweedy, midrangey and overdriven. You'll also find a treble cut switch and a level control for the spring reverb.

A JJ EL34 drives the output stage because Carr struggled to find KT66s of consistently reliable quality, and if anything we prefer it. The bottom line is that this amp can do anything from crystal cleans to extreme overdrive, all the while retaining an extraordinary level of touch-responsiveness and an unusual degree of sustain. The Mercury will enhance the natural tone of your guitar and genuinely make it sing.

The power switch takes things from small pub gig levels to whisper-quiet without changing the essential feel or tone of the Mercury. In fact the only thing that might turn off some players is the gradual treble loss on the tone-defeat switching. If you have the necessary funds but you'd prefer something smaller, you could do worse than to check out the Mercury 10.

FINAL SCORE

CARR MERCURY 12	
Build quality	**19**/20
Versatility	**19**/20
Sound	**19**/20
Value for money	**15**/20
Vibe	**19**/20
TOTAL	**91%**

TORRES
Big Boxer

8W, 1xKT66, 1x12"

PRICE **£725 (kit £425)**
CONTACT **Torres 020 8933 0918**
www.torresamps.com

All the amps from the Torres Boxer range are available as heads as well as combos, and if you're handy with a soldering iron you can save yourself some money by ordering a kit and building the amp yourself. Torres even makes biasing the power valve fairly simple, so you can tweak things to accommodate various output tubes – including a 6L6, a 6550 or even a beefy KT88, which ramps up the grunt to around 15W.

The Big Boxer's Fender influence is obvious both visually and sonically, but Torres' take on the classic single-ended Champ theme is an interesting one. For starters, the power has been ramped up from 4W to around 8W courtesy of a Tungsol KT66 power valve and a GZ34 rectifier. You should also factor in a valve-and-transformer-driven spring reverb, Treble, Bass and Midrange controls plus a 12" Celestion G12M. The components are laid out Fender-style on an eyelet board with a component count that includes silver mica and Sprague Orange Drop capacitors. The transformers and choke are all made in the UK to Torres' specs and the cabinet is solid finger-jointed pine.

In clean mode this amplifier is very much a blackface-with-a-British accent sort of deal, especially with the vintage-toned reverb dialled in. The Volume and Master controls don't interact as you might expect, so the loudest clean tone is achieved with both set just past the halfway mark.

Both controls provide their own overdrive characteristics. Turning up the Master adds a snappy drive that retains brightness with a throaty and slightly raw low-midrange texture. Alternatively, pushing up Volume thickens and compresses the tone, resulting in a smoother drive with softer highs.

FINAL SCORE

TORRES BIG BOXER	
Build quality	**16**/20
Versatility	**16**/20
Sound	**16**/20
Value for money	**17**/20
Vibe	**16**/20
TOTAL	**81%**

CORNELL
Plexi 7

7W, 1xEL84, 1x10"

PRICE **£815**
CONTACT **Cornell 01702 610964**
www.dc-developments.com

The clue is in the name: Cornell has attempted to achieve vintage Marshall tones at a volume that won't loosen your fillings. Everything you need is on the top panel, with controls for Edge (presence), Tone (treble cut) and Volume. There's also a four-way attenuation switch with settings A-D rated at 7W, 1.5W, 1/4W and 1/8W. Two ECC83s and an EL84 feature in a handwired circuit that feeds a Celestion Vintage 10.

Naturally we felt compelled to start testing with a Les Paul, and the Plexi 7 delivered everything we could have hoped for. Power chords crunched, single notes bloomed, and if we hit the right note in the right spot, feedback kicked in for near-infinite sustain. Any worries we might have had about boxy, small amp syndrome went right out of the window. This amp sounds big. However, we did have some mixed feelings about the power attenuation switch because it changed the overall tone and character of the distortion. Things stay fairly consistent between settings A and B, although the lower volume inevitably makes the tone sound a little less full. On setting C the overdrive seems to increase but it takes on a raspy and fizzy quality some might not care for. On the lowest setting the tonal balance sounds closer to settings A and B.

Clean sounds are available below volume level '2', but you can also crank it and clean up from the guitar to spectacular effect. For clean Hendrixy stuff with juicy touch dynamics or SRV tones with some Tube Screamer assistance, it's ideal. Regardless of its size and power this is a classic-sounding British rock amp, and it unquestionably lives up to the 'pocket plexi' promise.

FINAL SCORE

CORNELL PLEXI 7	
Build quality	**18**/20
Versatility	**17**/20
Sound	**18**/20
Value for money	**17**/20
Vibe	**18**/20
TOTAL	**88%**

BAD CAT
Mini Cat II

5W, 1xEL84, 1x12"

PRICE **£749**
CONTACT **Coda Music 01438 350815**
www.badcatamps.com

Established in the USA in 2000, Bad Cat has a user list that encompasses names from the Magic Numbers to the Undertones and Arctic Monkeys. The Mini Cat II, its smallest amp, has 12AX7s and an EL84 that generates 5W of power.

This amp isn't really about heavy overdrive, although it does develop some juicy grind near max-out on the Volume and Master controls. The tone controls take a bit of getting used to, because the Mini Cat is capable of generating serious quantities of treble. The Bass control behaves oddly, mind: the bottom end seems to peak around the centre point then drops off again nearer to the top of its range. It's not particularly influential either, although that may be attributable to some extent to the diminutive pine cabinet.

Fortunately the Mini Cat II can be plugged into an extension cabinet quite easily, and there's even an impedance selector switch providing 4-Ohm, 8-Ohm and 16-Ohm alternatives to the custom-made 12" Celestion.

The tonal signature of this amp is probably closer to a bright-sounding Vox than a Marshall or Fender. Given its compact proportions it's not surprising that it doesn't sound quite as 'big' as some of the other amps in this group, but it makes up for this with excellent touch-response and a very impressive way of bringing out the subtle details in your playing.

Getting the best out of it involves working with the controls on your guitar, and your playing touch can really spark the Mini Cat II into life. We particularly enjoyed it for stinging, wiry Robert Cray-style Strat tones and sparkly Travis picking on a Gretsch or a Tele. P90s sound pretty good too, but plugging into a larger extension cab is necessary to feel the full low end of a Les Paul.

FINAL SCORE

BAD CAT MINI CAT II	
Build quality	**18**/20
Versatility	**16**/20
Sound	**16**/20
Value for money	**17**/20
Vibe	**16**/20
TOTAL	**83%**

VICTORIA
2 Stroke

Up to 15W, variable valves, 1x12"

PRICE **£1023**
CONTACT **Guitar Experience 020 8973 1441**
www.victoriaamp.com

Fender's tweed Champ came with only a single volume control, but they also sold a version with a tone control and a slightly larger cabinet. This was the equally legendary Princeton, and the 5F2 version provided the inspiration for the 2 Stroke – which itself is Victoria's rendition of a project designed by former *G&B* editor Dave Hunter for his *Tube Amp Handbook*.

Victoria upgraded the circuit to accommodate any common octal valves including the 6V6, 6L6, EL34 and stock 5881 with no adjustments necessary, and a 5Y3 rectifies the wall-juice. To goose things a bit more there's also a boost switch that increases the available gain of the tone-shaping circuit and the large pine cabinet accommodates a 12" Eminence Legend speaker. The leather handle adds to the vibe and we love the two-tone blue and cream tolex with matching blue jewel light.

This amp is a thriller, and the tweed influence is immediately apparent with the raw enthusiasm of its overdrive and tactile sag. The clean tones are delicious too, with plenty of shimmery chime and cut that you may choose to tame with the Tone control for a jazzier vibe. Alternatively you can run the 2 Stroke flat out and just clean up from your guitar for lively and funky cleans.

The boost switch isn't overly dramatic, but it doesn't need to be. Besides a slight thickening in the low mids, the switch takes the 2 Stroke from a growl to a roar without changing the basic tone. It's a loud critter too, certainly capable of giving the Carr Mercury a run for its money on a small gig, but the simplicity of the two controls means it's nowhere near as versatile.

FINAL SCORE

VICTORIA 2 STROKE	
Build quality	**18**/20
Versatility	**16**/20
Sound	**18**/20
Value for money	**17**/20
Vibe	**19**/20
TOTAL	**88%**

The verdict

Back in the day, the price of valve amplifiers was always linked to Wattage. To an extent that lingers on today, so you might wonder why anybody would splash out several hundred pounds for an amp that isn't loud enough to gig with – even if it is handwired with boutique components, and the build quality is amazing. After all, there are plenty of cheap low-power valve amps these days, and if you want sonic variety it's hard to beat modelling amps.

However, some players take a different view... for very good reasons. As we all know, valve amps have to be cranked up to hit that sweet spot. If you're used to playing top-quality boutique amps when you're jamming or gigging with a band, it's a bit of a downer if you're obliged to use lesser amps when practicing at home because your main playing-out amp is simply too loud.

Many of us do the majority of our playing at home, so it makes sense to be able to optimise our tone at neighbour-friendly levels. What's more, low-power valve amps can be great for recording because mics won't overload, spillage is manageable... and small amps can actually sound 'bigger' than big amps. And where little valve amps were once one-knob or two-knob affairs, now you can opt for full-range EQ controls, onboard reverb, channel switching, master volume controls and even attenuation switching. These amps now occupy their own specialised niche in the market.

Up until the mid-'50s, most guitar amps were low-powered. If you lived in the UK you might have hoped to graduate from a Vox AC4 to an AC30 via an AC10 or an AC15, while in the US many players followed the tweed trail from a Champ to a Bassman or high-power Twin. While swapping for a bigger amp got players heard, turning their little amps up way too high was probably how many aspiring rockers first discovered distortion. But it's also true that players grew out of low-power amps because they sounded a bit too puny and boxy with their small cabinets and 8" speakers, and most were basically one-trick ponies.

Today, low-power amps have come full circle. No longer do they occupy the bottom end of product lines, and the ones we've reviewed all have something in common – they don't sound or feel like small amps. These are no-compromise products that allow you to achieve your ideal tone without overpowering other musicians or annoying your friends, family or neighbours. Having said that, there's also enough variety here to demonstrate that there's something to suit everyone's taste and playing style.

> Low-power amps have come full circle. These don't sound small – they're no-compromise products for getting your ideal tone

At the clean end of the spectrum, the Matamp Mini-Verb sounds composed and refined because it makes no attempt to be loud. All our guitars sound superb through it and the dynamic response feels just like a cranked-up boutique gigging amp. Run it flat out and control the drive from the guitar, then kick in a pedal when you want more overdrive... simple.

At the other end of the scale is the Cornell Plexi. If this amp were a person it would be Begbie from *Trainspotting* – going from barely on to stroppy, aggressive and downright dangerous in the blink of an eye. Despite being the smallest in this group and having a power rating of just 7W, it's actually one of the loudest... but it's capable of lovely shimmery clean tones too.

The Victoria 2 Stroke, Torres Big Boxer and Bad Cat Mini Cat II occupy the middle ground. All deliver sweet clean tones and all can overdrive, but they all sound very different. The Victoria does the '50s tweed thing; the Torres is more blackface; the Bad Cat provides a British flavour. The Torres is great value, and the facility to swap power tubes provides extra variety. The Victoria has a very full tone, while the Bad Cat feels heavier but is very portable – and easily enhanced with an external cabinet.

The Carr Mercury is far and away the most versatile amp in this roundup. If you could only take one amp to a recording session, you could be confident that you'd have all bases (short of death metal) nicely covered here. Quality costs, especially when you buy American, but valve amps don't come much better than this.

Shadow CABINET

RECKON A SPEAKER CABINET is just a wooden box with vinyl stuck on the sides and some holes cut for drivers? At the risk of over-simplifying an important piece of kit, you're not far from wrong. With just a few basic tools, beginners' woodworking skills and about £50-worth of materials (plus speakers) you can build your own bespoke enclosure. In Part 1, Dave Hunter gets you prepped...

Aside from the general soul-saving healthfulness of the whole DIY ethic (remember, readers, idle hands are the devil's playthings...), why on earth would you want to build your own speaker cabinet?

The answers to this are many: firstly, to get a good hand-built cab made of good woods and loaded with good speakers, for a lot less than you could pay someone else to do it; secondly, to tonally and/or cosmetically match a head you've already got; thirdly, to 'custom design' something with unique features; and fourthly, just for the blinkin' fun of it.

I set out building my own amps and cabs for pretty much all of the above reasons, and this project is no different. It's inspired partly by an urge to create a place to mount some reissue Jensen speakers, including the fabled 10" P10R as featured in the legendary tweed Fender Bassman amp and others; and partly by a need to sonically match a good cab to a blackface 1966 Bassman head modified a couple years ago to closely emulate that same late-'50s 5F6A circuit. And why am I writing this piece myself? Precisely because I'm not a professional amp builder or cabinet maker. We could have asked a cab designer from Marshall or Fender to write up a piece, but you'd rightly tell us, 'Sure, it's easy for them...' But believe me: if I did it, you can do it too.

This piece won't try to explain how to twist every screw and sand every edge, but it will get you close enough to the basic design and construction aspects of the project so that a modicum of common sense should carry you through. The primary point here is that you're building something for yourself – and learning and experimenting in the process – and, even with a wrong turn or two, if you proceed thoughtfully and carefully, you're still likely to end up with a great-sounding new piece of gear.

THE CUNNING PLAN

The 4x10" enclosure is a fine-sounding and versatile package too often overlooked in the world of extension cabs. Not nearly the size or weight of a big 4x12", a 4x10" nevertheless moves substantially more air than a 2x12" (nearly the same as a 2x15", in fact, if we're calculating from speaker cone surface area) while remaining relatively compact and easy to pop into the boot of a car. You get a great, broad frequency range too, the small-coned 10"s responding fast to your playing with shimmering highs, and in a team of four still producing fat, tight low end. So this project will celebrate the glories of the 4x10" cab, but we'll also give you dimensions to build a 2x12" or a 1x12" by applying the same techniques.

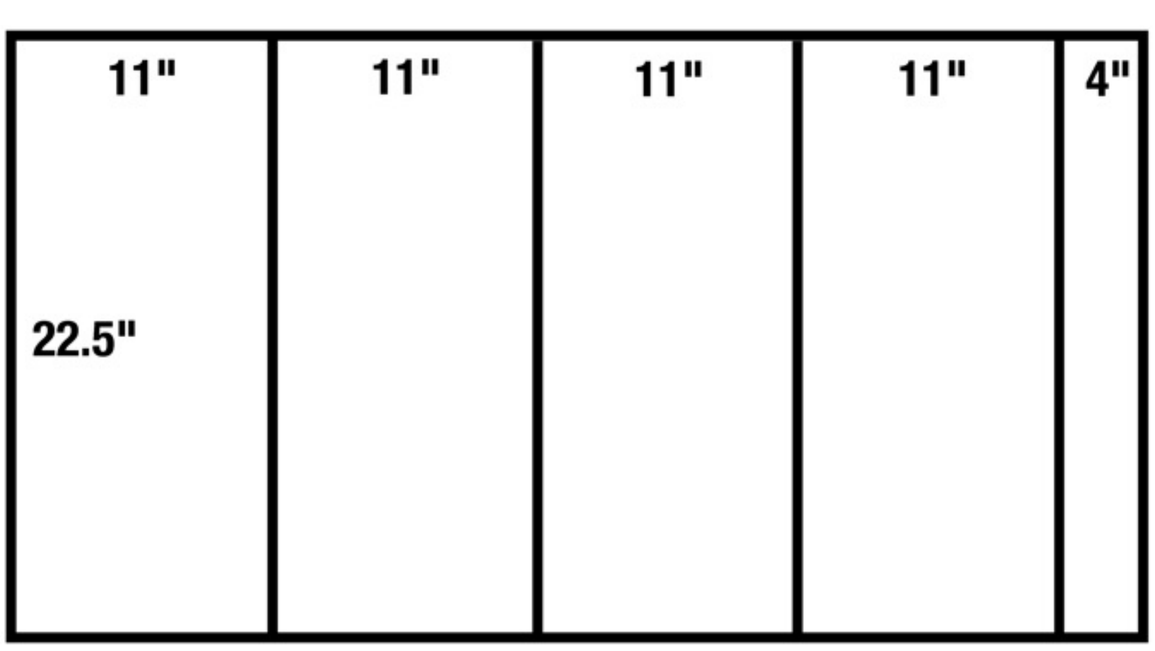
We will simplify construction wherever we can without sacrificing strength or performance. 'The important thing is to be able to cut a straight line,' custom amp builder Denis Cornell advises. 'Get four bits of wood, put battens in the corner, glue and screw it – and you're off!'

Vintage Fender cabs were held together with finger-jointed corners, but unless you've got advanced cabinetry skills that's hard to do right. As Denis suggests, we'll glue and screw our corners to lengths of 3/4" by 1.5" batten braces mounted in each; together with the baffle on the front and the screwed-in back panels, this makes for a strong box. Original tweed cabs were built of solid 3/4" pine, but we'll use plywood because it's extremely hard to find solid pine boards these days that are wide enough and not warped. Also, ply is much cheaper – and still makes for a strong, resonant cab. Denis says he's also had good results with 3/4" MDF board, though it can be heavier than plywood; the choice is yours.

HONOUR AMONG THIEVES

How do you decide what dimensions to build your cabinet to? Simple: just copy a good example of one that already does the job you're trying to emulate... and maybe even improve upon it. The first great 4x10" configuration came in the form of a combo

Diagram 1



Sheet one: Total 48"

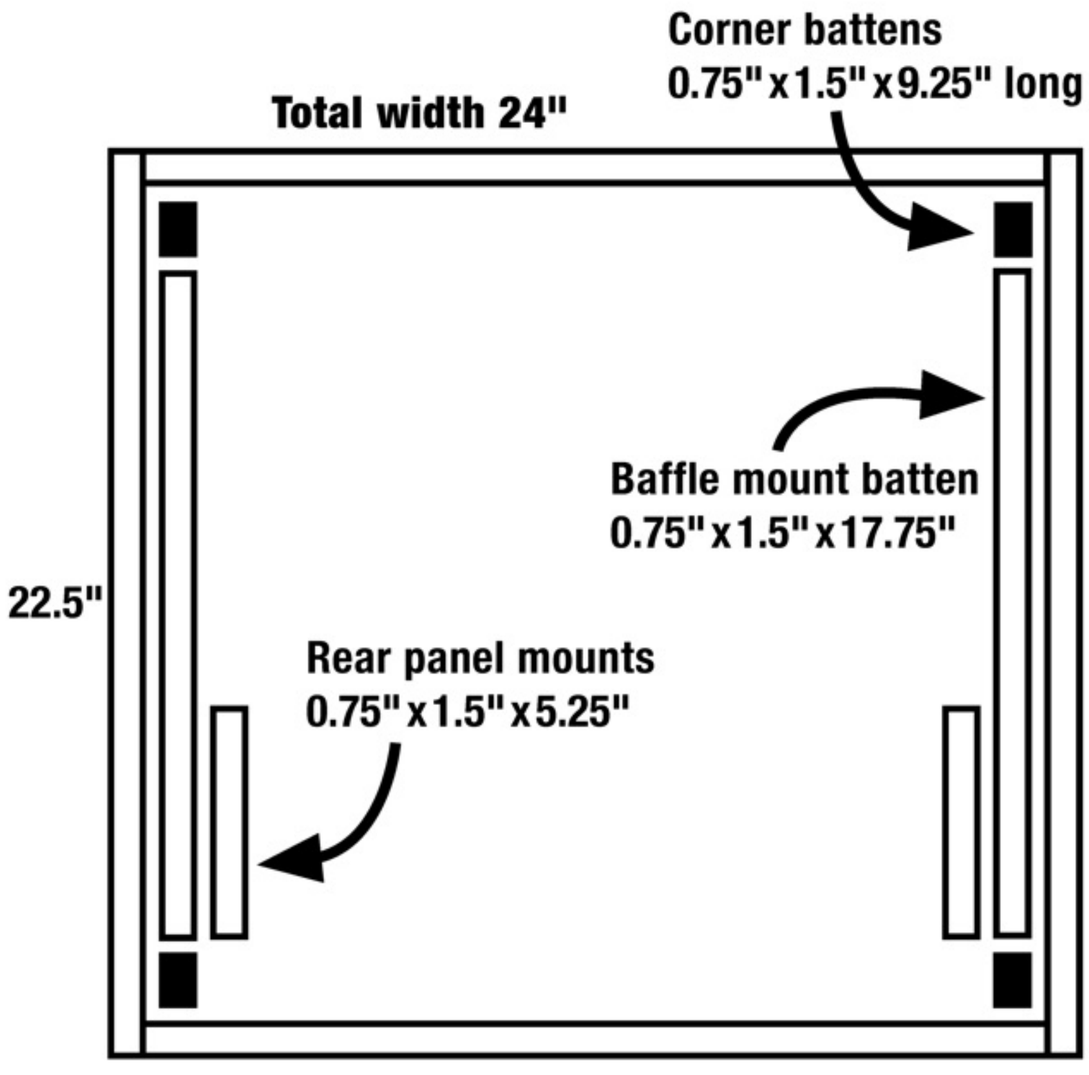
The completed DIY speaker cab sample: unique look, Bassman-like sound

– the aforementioned Fender Bassman of the late '50s – so we'll use those dimensions as our starting point. Leo Fender and his colleagues pretty much designed the box to hold as much speaker-power in as small a space as possible so it's a tidy, compact design (actually, we'll add an inch here and there to make it less of a squeeze).

The Bassman was 23" high, 22.5" wide and 10.5" deep. Simplifying things by making our baffle (the front board on which the speakers are mounted) a square 22.5" by 22.5" and all four sides an equal 11" by 22.5" (see Diagram 1), we come out with overall cab dimensions of 22.5" x 24" x 11" once the pieces are all glued together (see Diagram 2). The difference in height vs width is mainly significant because we'll be attaching our baffle at the sides, and that little extra width gives us the clearance to do so.

'With 12" or 15" speakers, I wouldn't use anything less than a 3/4" thickness for the baffle,' says Denis. 'With 10" speakers you might get away with 1/2".' Chancers that we are, we decided to live dangerously and use a spare piece of 3/8" ply that happened to be lying around. Fender discovered with the Bassman that by using a baffle of that thickness and attaching it at two sides only, leaving the other two to 'float', it would resonate with the speakers and contribute to tone and volume. It's also the thickness Gerald Weber uses for his well respected Kendrick amps. Of course, if you haven't got any 3/8" lying around and don't want to spend extra for it (or want to ensure your cab is slightly tighter for loud clean work or ➔

Diagram 2



Connections

Most good timber merchants will be able to supply the woods you need. Jewson have branches across the country; for their locations use the Branch Locator at **jewson.co.uk**. Likewise, your well-stocked local hardware merchant should have suitable trimmings that can be adapted to amp cab building; they might have upholstering vinyl and embroidering canvas (or other material suitable to use as grille cloth), or try a good craft shop or upholstery supplier.

Otherwise, if you want to stock up from people who supply specifically to the music trade, try Adam Hall (**adamhall.com**) or Allparts UK (**allparts.uk.com**) – among many others you'll find with a quick Google search.

Or if you want to make your box look like the big boys' ones, you can go straight to the source to obtain, er, 'replacement' bits:

- Fender: 01342 331700, UKQueries@fender.com
- Marshall: 01908 375411, marshallamps.com (click 'contact')
- Vox: 01908 304670, spares@korg.co.uk

A number of US companies supply accurate vintage coverings and hardware. These are two of the better-known ones:

- Parts Is Parts: guitar-parts.com
- Mojo: mojotone.com

Under your skin: the cab stripped of vinyl and hardware

crisp heavy rock), use the same 3/4" we're employing for the rest of the cab.

That's the theory. Now turn over to see the hardware and materials you'll need...

TOOLS

Obviously power tools make this work a lot easier. Many timber merchants can make the main cuts in your sheet of plywood for you – and do it neat and straight – so that's worth investigating. But if you don't have a jigsaw and drill, at least you might want to consider investing, or borrow them from a generous mate. But think safety: wear goggles and preferably a dust mask when cutting, drilling and sanding, and if you're not experienced using power tools, seek assistance... please! You'll need the following:

- a jigsaw
- a power drill, preferably with screwdriver attachment (or separate powered screwdriver); a countersinking bit is handy
- a tape measure and square rule
- screwdrivers, both flat and Phillips head
- sandpaper
- a staple gun
- scissors

MATERIALS

Cosmetically correct materials are available (Tolex, tweed, grille cloth, corners, handles etc) to make your cab match many of the major makers, from Fender to Marshall to Vox and others (see 'Connections' panel). But if you want to make this box your own unique fashion statement, the sky's the limit – plus you can save a lot more money by scavenging these bits of trim from your local DIY shop. Here's the list of what went into our cab.

- Wood: 4x4' sheet of 3/4" 'far Eastern' plywood for cabinet sides and baffle; 3m length of 3/4" by 11/4" 'joinery redwood' for corner and baffle mounting battens. Note: some timber suppliers will only sell this plywood in 4x8' sheets; if so, you'll have to find a friend to share the other half, or save it for cab number two.
- Screws: 18 x 1.75" no8 and 36 x 1.25" no8
- 16 x 1.25" no8 bolts with nuts and washers (approximate number, according to baffle and speaker frame thickness)
- 10 x 1.5" no6 screws and cup washers (brass is a nice touch): six for mounting the baffle, four for the lower back panel
- speaker wire, 1/4" jack and jack plate (a Tele jack cup, flat square side-mounting jack plate or similar should suffice)
- 1m x 42" upholstering vinyl – proper Tolex, tweed or other replacement covering for name-brand amps generally costs somewhat more
- 1m x 24" embroidering canvas for grille cloth
- corners x 8
- handle
- amp glides/rubber feet x 4
- wood glue
- contact cement 50ml tubes x 4

SPEAKER YOUR MIND

Ah, but you correctly point out that we've ignored the most important – and costliest – part of the whole exercise: the speakers. The fact is, of course, that even greater realms of personal taste come into play here. For a Fender sound, you could select the new Jensens like we did (or something similar from Eminence, Kendrick, Mojotone or Weber); for a more British-voiced cab to partner your Marshall, Vox or other head, you could look to Celestion or Tayden.

Either way you'll be spending from around £100 to over £200 depending on your choice of 10" – but even at the 'bottom end', with something like Celestion's Ten 30 (around £30), you'll be loading up with better speakers than you'll find in most generic cabs for the same money. It'll be up to you to check out as many options as you can in order to decide which drivers will be right for your sound.

START CHOPPIN'

Let's conclude Part 1 by making the major cuts in our wood, and generally getting all the constituent parts ready for assembly, which we'll cover in Part 2.

Sneaky trick: if you can convince your timber merchant to use their big, powerful sheet cutter to cut the 4x4' sheet of ply neatly into two but not quite in half – making one piece 22.5" x 4' – you'll be one step ahead of the game, and come home with something already resembling Diagram 1. (Yep, that magically yields us four equal sides plus the 'left over' 4" width for the upper back panel.) What's more, the edges they have cut – the crucial top and bottom edges which, after you've cut out the side pieces, will join corner-to-corner – will probably be flatter and straighter than you could do it yourself.

Now mark up your wood on sheet one, measure out the battens, make sure your saw blade is set straight and square and the wood is flat and well supported, and start cutting! Leave sheet two (or your spare 3/8" sheet) for next time, when we'll mark out and cut the baffle and back panel. We'll also conclude with the fun stuff: sticking it all together, gluing down the vinyl, and loading the speakers...

Amp Helpline

Q: Distortion is distortion – that's what I always thought, but lately I've been reading about players going on about 'great power tube distortion' versus preamp distortion. What's this all about? Is there a way to make sure you're getting either one or the other out of the same amp?

A: Yes, distortion does indeed come in two distinct breeds, when we're talking about the amp-generated kind (as opposed to that created by a pedal... which essentially is another form of preamp distortion anyway). To sum it up crudely, preamp distortion is often described as being 'fuzzy', 'fizzy' or 'sizzly', and here's where you can get the burning hot stuff at low volume levels; power amp distortion is associated with being warm and harmonically rich.

For a good example of the former, listen to the classic Mesa/Boogie amps, which employ ultra-hot preamps and pioneering 'cascading gain' stages. Examples of the latter are found in vintage Fender, Marshall and other great non-master-volume amps, which really come into their own tonally when cranked up. That fat, warm, crunchy distortion is coming from the power amp – and that's the tone that makes your vintage amp freaks go all mushy.

Makers of 'hybrid' amps are fond of putting a real valve in the preamp (and only in the preamp, for the most part) in order to entice you with promises of 'real tube tone', but it's worth knowing that this valve will only contribute to some form of preamp distortion/tone, and has no real chance of achieving the thick, vintage-voiced sounds of the latter variety.

What's better? Well, the only way forward is to try both, achieve the sound you like, and use it – that's the one for you. You can get a little taste of both on most amps fitted with a master volume control just by setting your two level knobs to emphasise each gain stage differently. First, turn the preamp gain control up high and the master volume low: that's preamp distortion. Next, turn the preamp gain down to zero and the master volume to full, then wind up the preamp gain until distortion sets in: that's leaning more towards power amp distortion. What you do with it is up to you!

Guitar Stand not included !

Duesenberg

NOT ALL WORKS OF ART BELONG ON THE WALL

In the South contact : www.brilliantdistribution.co.uk email sales @brilliantdistribution.co.uk : Tel : 01425489059

In the North contact : www.440distribution.com email : info@440distribution.com Tel: 01132589588

Brilliant Distribution Ltd.

Cab-Shaped BOX

Project: Part 2

HAVING HACKED UP OUR FEW QUIDS worth of plywood in Pt1, we're ready to stick all the bits together and start rocking with our own home-brewed 4x10" speaker cabinet. In Pt2, Dave Hunter gets you gluin' and screwin'...

If you followed Pt1 of this Amp Tech guitar cab project by now you should have your basic wood bits all cut to size and ready for assembly... even if just in your head for now. We've had the whys and wherefores and we already know what we're trying to achieve with this project, so Pt2 will get right down to a blow-by-blow look at getting your heap of scraps toward looking like a finely honed piece of rock hardware.

BATTEN THE HATCHES

Firstly, if you didn't do so after cutting out your side panels and battens last time, smooth off all rough edges with medium-grit sandpaper. And please note: when measuring to fit pieces together in the following steps, hold a scrap or an actual cut piece in place to mark the width of the necessary gap rather than simply marking off, say, 0.75" with your ruler to position a plywood top against a corner batten. The measurements of these thicknesses of timber are nominal only (ie not exact) and if you go around measuring off a precise 0.75" here and there things could end up decidedly gappy! Also, most measurements given for drilling and screw placement are only approximate: use your own common sense as you proceed to bolt things together, and be aware not to drill new screws into the sides of screws you've already placed (in corner battens, for example). So let's begin.

Lay one side down on a flat surface and hold the edge of the top in position against it at a perfect right angle (get a friend to lend an extra pair of hands at these early stages). Push a corner batten firmly up against it, approx. 0.75" from the back edge (later you'll partly secure your upper back panel by putting a screw through each corner and into the back end of this batten), and trace around it with a ballpoint pen.

Remove the top panel and batten, spread wood glue in the marked outline according to the instructions on the bottle, re-position the batten and tack it down with 1.25" panel pins (thin nails) hammered in about 0.75" from each end (see figure 1). This will keep them from sliding around during drilling, and you can just leave them in place to further strengthen the batten. Drill appropriately spaced screw holes, and drive home two 1.25" screws. Then repeat these steps for the bottom corner batten and twice again for the other side. As you proceed, remember to maintain the relationship between left, right, front and back of your panels and battens so everything will fit together as it should.

MOUNT UP

Put your four panels together and balance them upright in their correct position. With that mate again holding the sides in position, remove the top panel, smear glue on the edges that will meet up, and put it back in place. This is where your 1.75" screws come into their own: drill and sink three of them deep into the wider dimension of the 0.75"x1.5" batten from near (not too near!) each edge of the top to join the panels securely. (NB: counter-sink these and any other screws driven from the outside so the screw head sits flush with the panel rather than protruding.) Holding the lot carefully together, turn the box upside-down and do the same with the bottom.

Affix the top back panel by gluing the edges then putting one screw through each

upper corner and into the ends of the top corner battens as mentioned above; then position another screw lower down coming into the edge of the panel from each side, well-centred into the width of the edge of the wood and about 1.25" from the bottom of the panel. Now let all the glued joints dry before continuing.

This is a good time to sand the front, back and corner-join edges of your bare cabinet to round of the sharp angles somewhat. Look closely at most production amps, and you'll find few absolutely square, 90° edges. How much sanding and rounding-off you do is up to you – but as you proceed keep in mind the type of protective corners you plan to use: rounded Fender-like metal corners require a rounded corner and edge radius of 0.75"; square corners like on our sample cab require slightly sharper right angles.

Now position and affix the speaker baffle mounting battens. You'll need to determine the depth you set these back from the front edges against the thickness of the baffle board you've chosen, keeping in mind also the relative thickness of the grille cloth that will cover it versus the thickness of the vinyl to cover the cab. It's also a good idea to ensure the baffle is no prouder than flush – or even better, set in from the cabinet's front edges by a few hairs – to help prevent knocks and dings to the baffle as you haul the finished item from gig to successful gig.

Note we're using baffle battens of a length short enough that they don't clash with the corner battens running perpendicular to them. Smear your glue, tack in place with panel pins as before, and drill for four equally spaced 1.25" screws to hold the job tight (you'll be using three screws per side to affix the baffle itself, so keep that in mind as you position these batten screws). Now affix the lower back panel mounting battens in a similar fashion.

Cut a further batten long and wide enough to go just beyond the dimensions of your chosen cab-top carrying handle: this will help take some of the strain off the plywood top itself, and it's easiest to mount it now even though you won't fit the handle until near the end of the project. Turn the cab on it's head, measure to the centre inside the top panel, affix the batten with glue and panel pins, then drill the appropriate guide holes for your handle bolts/screws from the inside of the batten down through the plywood to avoid pushing it off its mount as you drill.

Now, to paint or not to paint? Many production cabs are painted with a matt-black finish inside, which both helps to seal the wood and give the end product a professional-looking finish. Depending on your chosen grille cloth you may want to paint the speaker baffle before covering, too (though after cutting it out as described below), to help 'disguise' the black speaker cones themselves from the front and prevent the light white-ish plywood from showing through the material. The decision is yours.

THE VINYL SOLUTION

This seems a straightforward step, but can be tricky if you don't proceed carefully. The key here is to cut each piece to its correct size, check its position by laying it out 'dry' on the appropriate cab panel, mark it, and set it aside before beginning to glue anything down. Contact cement is sticky and unforgiving stuff (if you know of anything that's easier to work with and will bond cloth-backed vinyl securely to wood, go ahead and use it) and once you've spread it on and laid a piece down, it can be impossible to re-position. Some hints to smooth and trouble free cab covering are:

- Cut the sides longer than the top and bottom to fully round the corner edges and 'underlap' the top and bottom pieces by about 1", and to fold around inside the cab far enough that no wood will show when the baffle and rear panels have been mounted. Cut the top and bottom pieces the same length as those 22.5" plywood panels, but appropriately wider, so that they will simply wrap around the panels without needing to be further cut, notched or folded
- Cut carefully placed and measures 'V's into each corner to be wrapped around inside the cab to avoid excessive gathering/layering of material

Roll vinyl carefully down onto glue-prepped cab

- Stick the sides down first
- Put cut piece in position, place a weight on one half then gently fold back the other; smear out the cement (you may need to let this set for a few minutes – follow manufacturer's instructions); carefully roll that half back down so there are no trapped air bubbles and smooth well down; move weight to the glued half, fold the unglued half back and continue
- Edges wrapped out of sight inside the cab can be stapled down – you may even want to do this to one edge before gluing to help hold each piece secure; you can also staple the edges which will eventually be overlapped by the top and bottom pieces
- You might want to let each glued side dry sufficiently before proceeding to the next in order to prevent shifting or wrinkling the vinyl; if not, work very carefully

Conclude by covering the lower back panel in the same manner. You'll want this to be a tight fit, but check before proceeding that it won't be too tight to fit into place once the panel and cab have both been covered with vinyl.

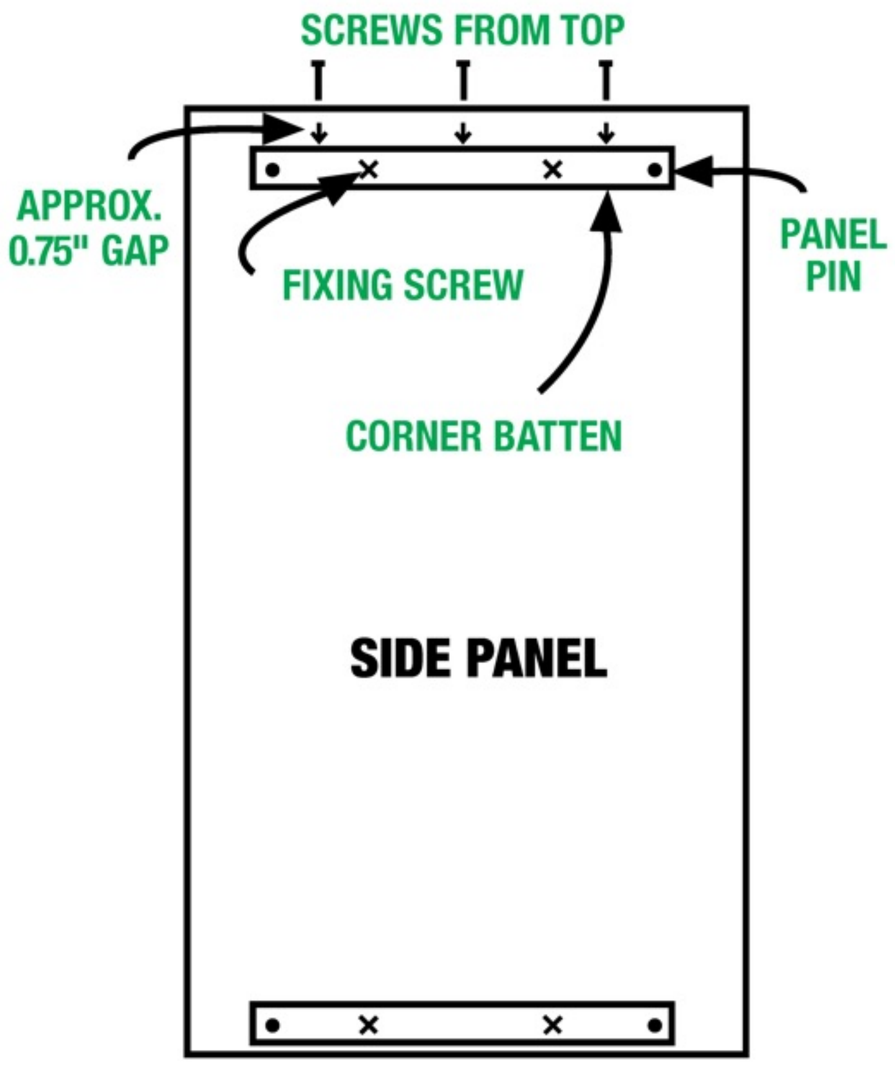
Now's a good time to finish applying your cabinet trim: fit the handle, screw or nail on the corners, and fit the amp glides/feet – far enough in from the edges of the corners to avoid chipping the plywood, but not so far as to sacrifice the cab's broad centre of gravity.

ABSOLUTELY BAFFLING

We've waited until now to measure and cut our speaker baffle because it's important to fit this piece with as close a tolerance as possible. However careful you've been with measuring, cutting and fitting the basic box, chances are the dimensions will have slipped a small fraction of an inch from the 'perfect' design on paper.

While each of your side panels were an equal 22.5" long, and the ➔

Figure 1



Back of finished cab: note fixed upper panel, removable lower, and black interior

outside measurement of your assembled box should be something very close to 22.5" high x 24" wide, you'll note the inside measurements come to around 21" high x 22.5" wide (see, you subtract that 0.75" created by the thickness of the plywood at each side). This will be the approximate dimensions of your speaker baffle, but you need to allow a little gap to fit it into that space without actually rubbing any edges too badly after you've got the grille cloth fitted, so you'll need to reduce these dimensions by some 0.125" to accommodate this. Also, be aware at this point that it's handy the baffle will be wider than it is tall, because you need that extra <0.75" at each side to give space to join it up to the baffle mounts. If it's a shade too tight after cutting, you can always shave some down with a plane or coarse sandpaper, but it's easier to get it right now. Fine, so go ahead and cut it (from 3/8", 1/2" or 3/4" ply as discussed in pt1).

Sand the baffle edges and lay it out on a clean, flat surface to prepare for cutting the speaker holes. Unbox your four 10" speakers and lay them out evenly spaced around your baffle board (remembering to keep them a shade over 0.75" from each side to allow for mounting the baffle to the battens already affixed in the sides of your cab shell). If your dimensions are right, you should be able to keep some 0.125" extra space between the speakers and the edges of the baffle so nothing is touching or rubbing. Take a ballpoint pen and trace a circle around each speaker frame, then mark the bolt holes through four mounting holes in the frame of each speaker, and put them back in the box.

You now need to draw the actual cutting dimensions for your 'sound holes' as circles inside the speaker-sized circles you've already drawn, approx. 1.5" smaller in diameter than the speakers themselves (see figure 2). A search through the kitchen cupboards might turn up a side plate, soup bowl or mixing bowl of just the right diameter to trace around. If not, make a template out of cardboard. (NB: with thinner baffles in cabs as compact as this, I like to square off the inside edges of each circle to leave a little extra wood down the centre for added strength).

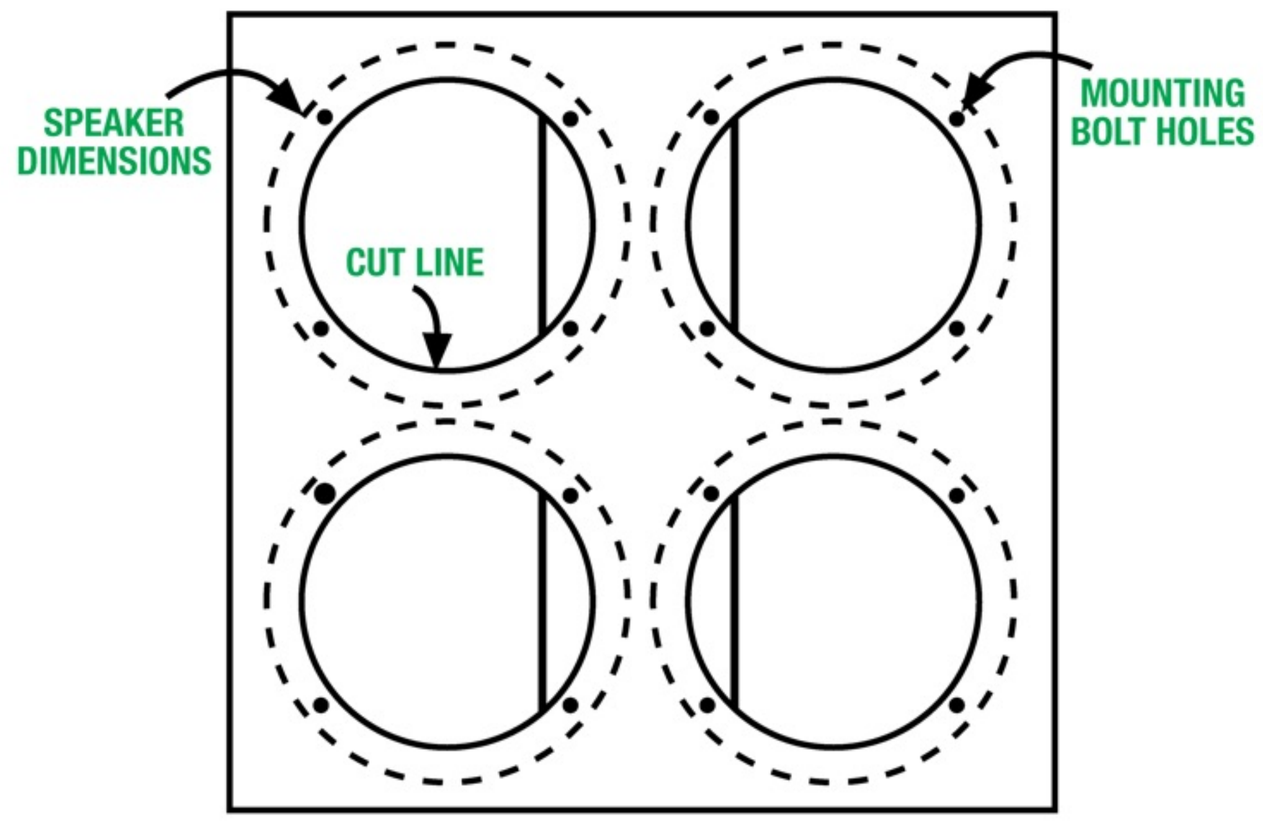
Drill the speaker mounting holes: select a bit close to but not larger in diameter than the no8 bolts you'll use, so that the bolts' threads bite somewhat when you screw them in, and drill slowly and carefully so as not to chip the plywood as the bit pushes through (drilling into a piece of scrap wood helps here). When the holes are drilled, counter sink each one so the bolt heads will sit flush into the wood at the front, then drive each bolt tightly home.

Cut your chosen grille cloth so there's about an inch spare at each edge to wrap around the back of the baffle board at all four sides for stapling – maybe a little more at the sides so the staples clear the baffle mounting battens without rubbing against the wood. Lay the cut cloth on a clean, flat surface, lay the baffle onto it and adjust to space it evenly: now cut each corner of the excess border cloth off square so there will be no gathering or overlapping of material at the back corners (see figure 3). Next, pull the top edge down and punch in a few guide staples to hold it tight, then fold the bottom edge over, pull tightly as you go, and staple it securely. Proceed similarly with all sides, pulling the cloth tight as you go – but not so tight as to distort any pattern or weave in the material.

Lay the cab down on its back, set the covered baffle in place (you might want to help centre it using cut strips of card around the edges as spacers), and drill for three appropriately spaced screw holes at each side. It's crucial here to remember the placement of your baffle batten screws, and we want these close enough to the edge of the baffle to bite firmly into the near-centre of the mounting battens, but not so close the edges as they may split or pull loose just as you hit that power chord at volume. Tighten the piece down with the six 1.5" no6 wood screws in their finishing washers.

Flip the cab over onto its face, and begin installing your speakers one by one. After slotting each speaker down and running a washer onto each bolt, twist each nut down so it's just finger-tight, then gently tighten each with a spanner just a half to three-quarters of a turn further, so the speaker is securely bedded but well short of risking bending the frame. Check speaker nuts every few gigs/months and gently re-tighten any that have worked loose.

Figure 2



...The Spice of Life

So not everyone wants a 4x10" cab? Well, fair enough. As promised in Pt1, here are some handy dimensions for building 1x12" or 2x12" cabs – though if you've read and digested both parts of this DIY series you can probably apply the basic principles behind the 4x10" to design any configuration for yourself.

As with the sample cab, we'll do the easy thing and 'borrow' these from Fender (we've made them a little deeper to better stand a head on, and lopped off 1.5" from the height for lack of chassis and control panel). The first is taken from a Deluxe Reverb, the second from a Twin Reverb.

- 1x12": 16" high x 24.5" wide x 11" deep
- 2x12": 18.5" high x 26.5" wide x 11" deep (generally configured with the speakers mounted slightly diagonally toward opposite corners of the baffle).

WIRED FOR SOUND

Check our impedances box and a look at Figure 4, then using sturdy, heavy gauge speaker wire (from Tandy or any hi-fi or

Impedances

Speaker impedance can be an involved subject, but it's easy to boil wiring down to a few simple configurations as illustrated in Figure 4. Great guitar amps throughout history have had output ratings of 2Ω, 4Ω, 8Ω and 16Ω, but the vast majority of production speakers are rated at 8Ω and 16Ω – so how do we get the combinations? Some basic maths and a few diagrams will help us greatly here.

The rule of thumb for impedance matching is...

- For speakers wired in parallel, divide the impedance rating of the speakers used by the number of speakers in the cabinet to determine the total load (two 8Ω speakers in parallel create a 4Ω load; four 8Ω speakers in parallel create a 2Ω load, etc).
- For speakers wired in series, multiply the impedance of the speakers used by the number of speakers in the cab to determine total load (two 8Ω speakers in series create a 16Ω load, etc.).
- How is it the four 16Ω speakers in, say, a Marshall 4x12" cab are driven by a 16Ω rated head rather than a 4Ω or 64Ω? This is where series/parallel wiring comes in handy. The last example in Figure 4 shows how by combining two separate series-wired groupings of speakers together in parallel, it's possible to create a load equal to the impedance of the individual speakers.

electrical supply shop – split carefully down the centre if necessary to make dual runs into single) wire up the speakers for the appropriate configuration to match your amp head.

Cut a hole in your preferred position on the upper back panel, mount the jack socket/plate, drill and affix the lower back panel with the four remaining 1.5" no6 screws and cup washers... and you're done!

Plug in, switch on, and give it some. Notice how fantastic it sounds? That's because you made it yourself! We haven't designed this cab for mega-volume thrash or heavy metal, but it should handle pretty hefty volume levels from a 50W or 100W amp without much vibration or mechanical noise being apparent (but be reasonable: most combos or cabs will produce some vibration noise when you get them up to full-tilt – and as long as you don't hear this over the 'music' they're not a big problem). If you're getting excessive unwanted vibration noise, check the speaker nuts, and re-tighten baffle, back panel and handle screws. If they persist, try to pinpoint the source of the noise and apply a well-aimed squeeze of wood glue or, perhaps even better, flexible grout/filler to soak up wood-on-wood vibrations. Good luck!

Figure 3

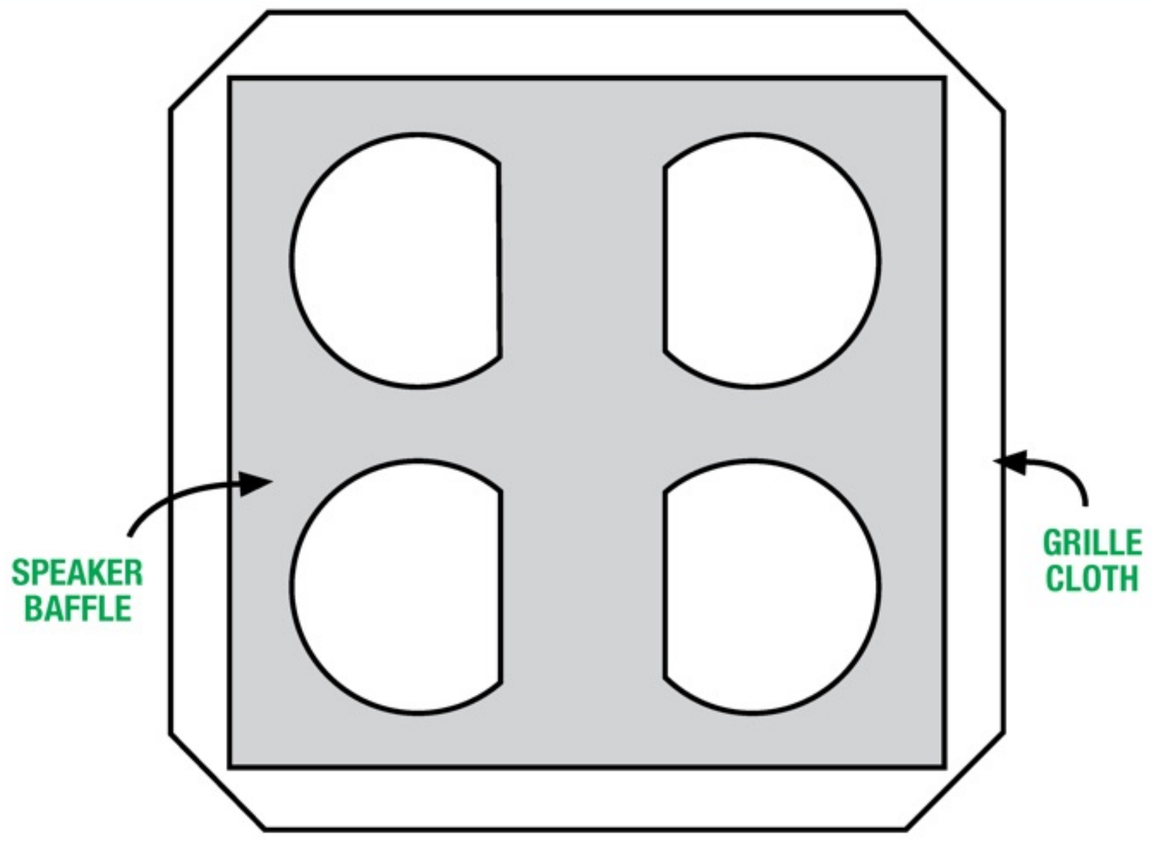
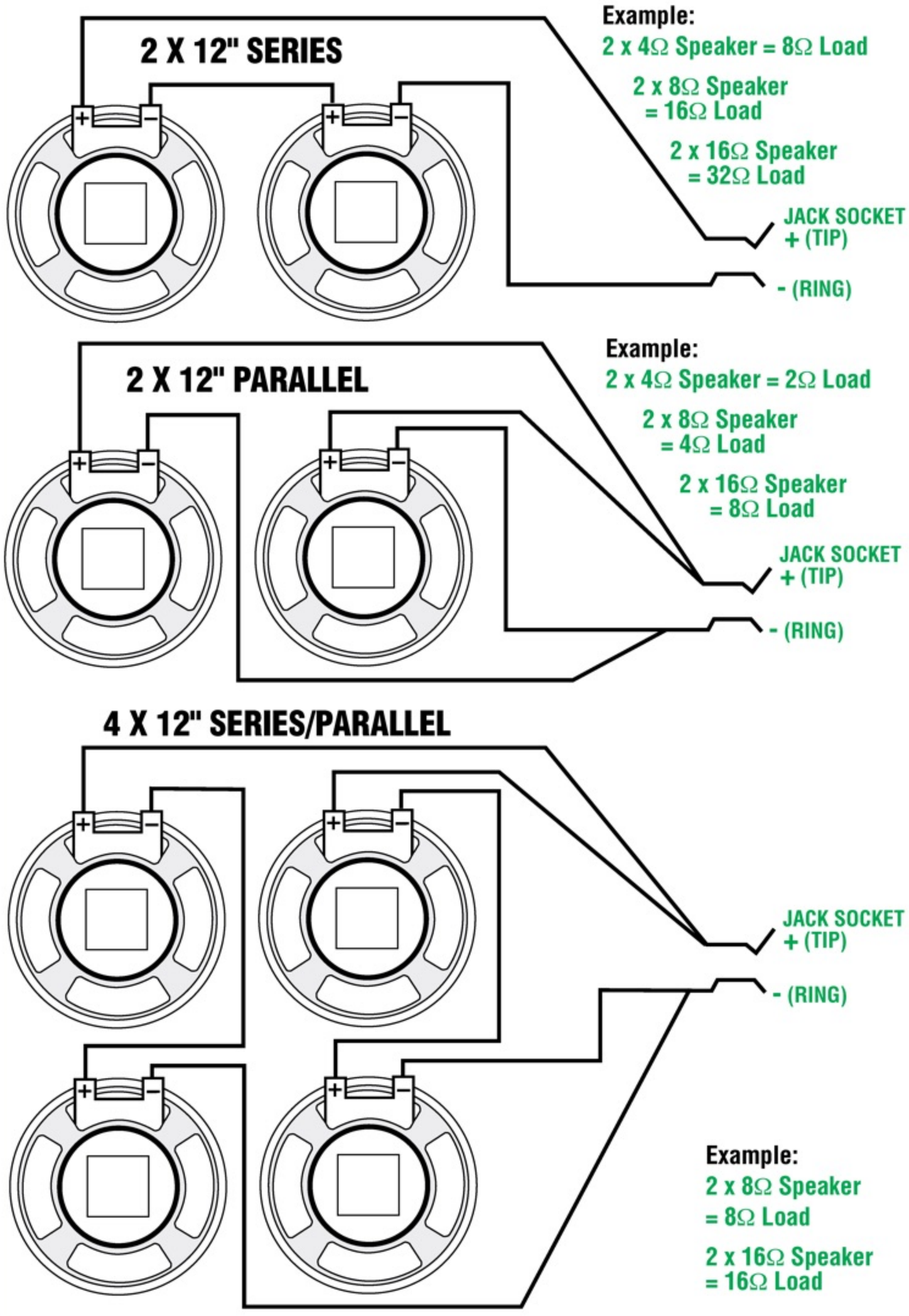


Figure 4



THE 20 GREATEST AMPS OF ALL TIME

Picking out a mere 20 amps as the best ever is not a job recommended for insomniacs. It'll keep you awake at night as you come up with yet more potential candidates – and as for those you leave out, the ten 'bubbling under' would be top of many players' lists. In short, take this bookazine to a bar with three or four guitarist friends and let the drinks and opinions flow. Pub fights? We love 'em!

How, exactly, do you narrow down the whole groundbreaking Fender range into two or three representatives? Likewise Marshall – who, at the outset, unashamedly copied Fender... so maybe they should be marked down? (The writer ducks, anticipating a Reading Festival-style shower of beer cans.) Then what about modelling amps – include or not? And unless you're judging by size, the tiny but ubiquitous Pignose surely has a case.

Add to that the split between amp heads and combos, valve and transistor, production and boutique, the classic years of each (we've come up with suggestions, your view may vary), and you have, as we mentioned, all the ingredients for fights and restless nights. As this publication has now gone to print, we can sleep easy. Let the debate begin... at any volume from 1 to 11.

AMPEG
Echo Twin (1964)

The Ampeg Echo Twin comes from an era when guitarists and accordion players were of equal importance. And the Echo Twin catered royally for both.

The ET-1, produced from 1962 to 1963, was the first of a series and was a true stereo amplifier, two 15-Watt amps each driving its own 12" speaker. It produced 30W of power in mono, and 15W in stereo. The ET-1-B, made from 1963 to 1964, combined solid-state rectification with 7591A power tubes. Each side has its own tremolo, with volume, tone, tremolo depth and tremolo intensity controls. A toggle switch activated the reverb, depth being controlled by increasing the volume on Channel 1. A single tone control was probably the only drawback.

A move to a larger factory saw the arrival of the ET-2-B Super Echo Twin. With an extra power transformer as a failsafe in case one blew, this was in effect two Reverberocket amps in one package. At nearly $380, the Super Echo Twin cost about $40 more than its predecessor. A footswitch to activate reverb and vibrato was wired into the amp, ensuring it could not be lost – a boon for forgetful guitarists.

Ampeg founder Everett Hull was a jazz fanatic who felt an amplifier's sound should be – and should always stay – clean. But a Strat can make an Echo Twin sustain very sweetly, as Peter Frampton among others will attest.

Photo courtesy of www.maindragmusic.com

DUMBLE
Overdrive Special (1983)

Unless your Euromillions number comes up you will probably never have the pleasure of playing through a Dumble, let alone an Overdrive Special. Los Angeles amp tech Alexander Dumble, who got his start as a teenager making amps for surf-rockers the Ventures, built on a person-by-person basis, requiring a large deposit at the outset. His are the most desirable and expensive boutique amplifiers ever made, and the Overdrive Special is the most sought-after of the sought-after.

Dumble's handmade amplifiers became popular in the '70s and early '80s thanks to the quality of their overdrive and the patronage of tasty Stateside pickers like Robben Ford, Larry Carlton and David Lindley; the last-named's famed solo on Jackson Browne's *Running On Empty* was played through one. Their initial two-thousand-dollar pricetag, steep at the time, has since predictably soared.

The 100-Watt Overdrive Special combo was originally based on a blackface Fender, but it evolved over the years. It used 12AX7 tubes in the preamp section and up to four gain stages for the lead channel, all through a 12" speaker. The quest for Dumble's sound has spawned many clones, but analysis of his methodology has been made difficult by Dumble coating the insides of his amps with epoxy resin.

So keep buying your lottery tickets in the hope of enjoying what a 1990 advertising leaflet called 'the freedom of switching from a warm but glassy clean presentation to a luscious, sustaining tone rich in harmonics...'

Photo courtesy of www.ampgarage.com

FENDER
Tweed Deluxe (1959)

Fender's peerless range of classic amp designs could yield a Top 20 of its own, but proof that the Deluxe was king of the late '50s comes in the fact that Ricky Nelson's guitarist James Burton used one for sessions and a Twin for roadwork.

The low-output Deluxe entered production in 1946 (as the Model 26) and was one of the first amps Fender produced under his own name. It officially became the Deluxe in 1952 and was a wide-panel tweed design until the middle of the decade, when output leapt from 10 to 15W. The top-mounted control panel was simplicity itself, with three pointer-shaped knobs for 'mic v', 'inst v' and tone; the speaker was a 12" Jensen, having been upgraded from 10 inches in 1948. A 20W blackface Deluxe Reverb would be made available from 1963, but tweed is the collector's choice.

The lack of a negative feedback loop in the classic 5E3 circuit plays a part in its ragged charm – Deluxes have little headroom and tend to distort at quite low volumes, which is part of their appeal for many players.

Fender's golden anniversary was celebrated in 1996 with an exact replica of the Model 26 amp, accurate right down to its wooden handle and red felt grille with chrome strips. Two years later, a more representative Deluxe that looked like a tweed classic was advertised in front of a ZZ Top-style automobile. Yes, this design had legs...

Photo courtesy of www.gbase.com

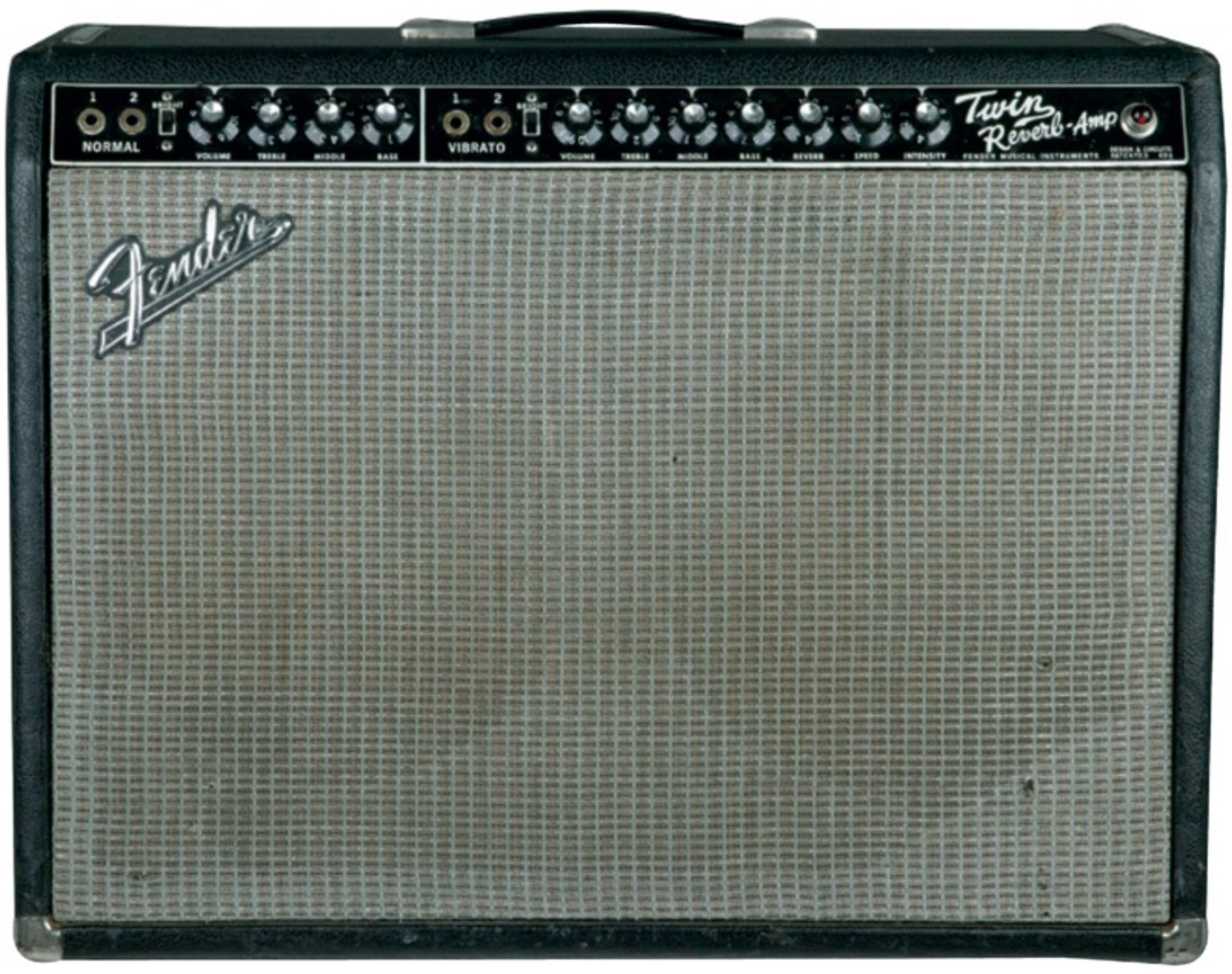
FENDER
'Blackface' Twin Reverb (1965)

The cover of the 1963-64 Fender catalogue featured a fiesta red Jaguar leaning rakishly against a new 'blackface' Twin Reverb amp – the latest version of Fender's flagship combo, which now incorporated effects. The blackface era, referring to the colour of the front-mounted control panel, stretched from 1964 to 1967 and has since become iconic. The most coveted amps were made before Leo Fender sold his company to CBS in 1965.

With two 12" Lansing speakers, it was a combo suitable for use on its own in small clubs without the need to be amplified through the PA system. About 80W of sharp, clean sound compared well with the original Twin, introduced in 1952, which had developed just 15W. The reverb spring, originally devised by the Hammond organ company for keyboard use, was aimed at the country market.

Post-CBS 'silverface' Twins eventually had a master volume control but many guitarists have converted silverface amps to blackface specifications. The original Twin predated the Stratocaster by a couple of years and has grown in stature and reputation alongside that guitar.

There have since been other variants, but today's reissue Twin Reverb has two channels, legs to allow it to be tilted back on stage and 11 silver-topped control knobs instead of the four it started out with. But the fine lineage of the amp remains unarguable.



FENDER
Bassman (1959)

The year of 1951 brought the Precision bass – and, as you'd expect, Fender offered an amplifier to play it through. This was the Bassman, described in the advertising of the time as 'specially designed for bass reproduction' with a 'custom-designed Jensen 15" speaker, true fidelity bass reproduction, excellent volume characteristic and rugged construction'.

Its valve-driven 26 Watts offered enough power to let a Precision with flatwound strings make a reasonable facsimile of an upright. It had a ported, closed-back cab, and prided itself on undistorted tone. In the end, however, the Bassman was hijacked by guitarists who discovered that, when the volume was cranked up, the result was a distinctively sweet, compressed sound.

A redesigned version created history in November 1954 by housing four 10" Jensen P10R speakers, now handling 40W. The Bassman now had an open back like a guitar amp and, indeed, when Fender reissued the combo in 1990 in the form of a replica of the 1959-vintage Bassman, it officially changed its designation to guitar amplifier.

Six-string users of the Bassman over the years include Buddy Guy, who found that overdriving it with more powerful pickups created a tone perfect for blues. More recently, Brian Setzer and Josh Homme have used it for live work, while Kurt Cobain had one at hand when recording *Nevermind* in 1991.

HUGHES & KETTNER
Coreblade (2009)

Predicting future classics, either in the guitar or amp realms, is a task for fools... but we'll stick our neck out and suggest the Hughes & Kettner Coreblade, introduced in 2009 and developed from the Switchblade, will be around for longer than most. It's a head that attempts to combine digital technology with traditional values and does so well.

There are four channels (clean, drive, Ultra 1 and Ultra 2) while the traditional – four EL34 valves plus three 12AX7 in the preamp – combines with programmable tone and effects (delay, chorus, flange, phase and tremolo) settings. These may be stored in 128 memory slots, accessed by a MIDI stageboard and saveable to a USB stick. Digital reverb is also offered.

Yet more impressive technology comes with TSC (Tube Safety Control), a 'built-in tube technician' that automatically biases the amp to extend valve life, can shut down defective tubes in mid-gig and even allows EL34 and 6L6GC valves to be operated simultaneously. All in all, to quote one impressed reviewer, the Coreblade 'has more functions and features than a Swiss army knife'.

Visually, the Coreblade has the fierce and rugged aspect of a Hummer SUV, while the pricetag makes clear it's aimed at professional metallers. Tone, features and build quality are all worthy of a higher-priced amp, and the USB settings-storage solution alone is a popular innovation. Future classic? We think so.

LANEY
LA100BL (1970)

Most hard rockers graduate to Marshall and stay there. Black Sabbath's Tony Iommi had to be different, ditching a Marshall 50-Watter for the Laney amps he used on the band's first, eponymous album released in 1970. He confesses he switched to Laney because they were a relatively new company (formed by former musician Lyndon Laney in 1967), Sabbath were still low-earning newcomers and Laney were based in the band's native Birmingham. The offer of free gear clinched the deal.

Six 4x12 cabinets were fed by four 100W LA100BL amps. The circuit they used would be re-used in the Supergroup, the next commercially available version of the amp. Iommi used a modified Dallas Rangemaster treble booster (Laney introduced the Klipp series of amps with built-in treble boost as a result) and stuck to Laneys for the better part of Ozzy-era Sabbath. Unfortunately, when the band hit the big time Stateside these amps performed poorly on the road due to electrical differences, meaning he couldn't use effects for fear of causing the all-important stage volume to drop.

When, in 2004, Laney relocated to Halesowen, Iommi was invited to cut the ribbon on the new factory. He now has a signature 100W head and small practice combo, and though he briefly defected to Engl in 2007, the bond continues. Not bad for an alliance forged on 'freebies'.

MARSHALL
Bluesbreaker (1965)

The Who and Jimi Hendrix are both associated with Marshall amplification – but when Eric Clapton plugged his Les Paul into a Marshall combo he created a new kind of sound that has remained a personal trademark, not to mention a blues staple, since the *Bluesbreakers With Eric Clapton* album in 1966.

The late Jim Marshall recalled to *G&B* that, in 1963, Clapton had come to him and complained he could not fit a 4x12" cab and an amp head in his car. 'So I said, "Well, let's have a go at making a combo!" And that was the Bluesbreaker, which was still 30 Watts but sounded a lot louder. I managed to fit that into a 2x12" cabinet I manufactured myself; Eric was over the moon with it.'

The *Bluesbreakers* album inspired a generation of six-stringers across the world. It may sound relatively polite now, but those overdriven tones were genuinely groundbreaking in the mid-'60s. Drummer Hughie Flint put its impact down to the fact that, unlike the others, Eric treated the studio like another gig and played at the appropriate volume.

While Clapton's famous combo included tremolo, Marshall tended to put volume at the heart of matters, believing overdrive and distortion were of greater interest to most players. Gary Moore was among the later users singing the Bluesbreaker's praises – and, like Slowhand himself, it's unlikely to go out of fashion any time soon.

MARSHALL
JCM 800 (1981)

The JCM (James Charles Marshall) 800 emerged in 1981 as his company cut loose from an international distribution deal with Rose Morris. Though 800 was an arbitrary number, the amp would dominate the '80s as hard rock made a comeback. Initially a cosmetic revamp of the Master Volume and Super Lead models, it sported a new look – larger logo, white piping, grille cloth – and sold at a more affordable price. The single-channel, no-nonsense 100W head was set to shape a new musical era.

New US distributors Unicord replaced EL34 valves with 6550s, deeming them more reliable. This added a harder edge to the sound and these amps became more difficult to overdrive; the likes of Slayer's Kerry King and Jeff Hanneman, and the ubiquitous Zakk Wylde of Ozzy Osbourne and Black Label Society fame, would take these to their hearts. In Britain, NWoBHM bands like Diamond Head, Judas Priest and Iron Maiden were more than happy with the 'domestic' version.

Compared to the earlier Master Volume series it replaced, the JCM800 offered the possibility of being patched internally and linked with other amplifiers – leading to whole new levels of loud. Next came the Model 2210, with two footswitchable channels, offering separate lead and rhythm sounds. Its built-in effects loop and reverb were also firsts for Marshall. Once a problem with the new Celestion speakers was solved by reverting to older models, a decade of world domination awaited...

Photo courtesy of Doc Ginero

MARSHALL
JTM 45 (1962)

Former drum teacher Jim Marshall developed his amps at the suggestion of volume-hungry guitarists like Pete Townshend and Ritchie Blackmore, and put Britain firmly – and loudly – on the amplification map. The JTM 45 (for Jim and Terry Marshall, his son) used the Fender Bassman as its template, copying some aspects of the design but ultimately using EL34 output valves instead of Fender's 6L6s. The result, through Celestion speakers, was a distinctive and very powerful sound. 'Although it was called the JTM 45,' explained Marshall, 'it was 30 Watts... but it used to peak at just over 50.'

Things moved on apace, and Marshall's first ever 100W head was the dual-output-transformer JTM 45/100, easily identifiable by an acrylic glass front panel, the trade name of Plexiglas earning these amps the nickname Plexis. Its two channels – high treble and normal – each had two inputs (high and low sensitivity) and separate loudness (volume) controls. Both channels shared the amplifier's four tone controls: treble, middle, bass and presence. It contained three ECC83 (12AX7) valves in the preamp and a quartet of KT66s in the power amp, the latter being standard issue in mid-'60s Marshalls. Technical details would change over the years but this basic template set the rock amplification standard.

Jim Marshall reclaimed the sixth prototype, christened #1, in the late '70s, and it now takes pride of place in the company museum.

MATAMP
Series 2000 (1968)

When Huddersfield amp designer Mat Mathias linked with friend and hi-fi amplifier designer Tony Emerson in the early '60s, Matamp was the result. Production began in 1964... and their 100-Watt Matamp Series 2000 was destined for greatness the minute Peter Green, of newly minted blues supergroup Fleetwood Mac, adopted it as his amplification of choice. Mathias toured the US with Fleetwood Mac as their soundman and, when demand for his product became too great, linked with up-and-coming British manufacturer Orange to fulfil it.

When Mathias asked Green how he wanted the amp to sound he said: 'I want it to sound sweet, but not like treacle. Like honey.' Mathias, like Green, preferred clean tones and hated distortion, and would often jump up on stage to fiddle with the EQ and volume during songs. (Leo Fender was also accused of this in his time.)

There's photographic evidence that Matamps were used on *Albatross* and the first Fleetwood Mac album, along with the matching 'Matamp Reverb Tank'. The 100W amps the band took on their first US tour were custom-built, but the aluminium chassis proved less than rugged and they were cannibalised for parts when the tour was over.

The group then adopted a Fender backline for live work, having been impressed by BB King's Dual Showmans; BB, ironically, was equally enamoured of the Mac's Matamps! Their loud, clean, distinctive tone is still highly prized.

MESA/BOOGIE
Mark 4 (1990)

The Mesa/Boogie story began in the late '60s when San Francisco amp repairman Randall Smith began to modify Fender combos to make them louder. One of his earliest customers was Barry Melton, 'The Fish' of Country Joe & The Fish fame.

Smith created overdrive options through master volume controls – an industry-standard feature by the mid-'70s but revolutionary then. This resulted in the Mesa/Boogie range of amps – christened by Carlos Santana, who said 'that little thing really boogies'. Master volume circuitry gave the preamp and power-amp stages separate volume controls – and, though it had not been the intention, the preamp could now be set high to overload the output stage.

We've selected the Mark 4 of 1990 as representing the apogee of Mesa/Boogie technology. Pushing 85 Watts of output generated by four 6L6 and five 12AX7 valves through a 12" speaker, it combined size, power and versatility, and was available as a head or combo.

All three channels (rhythm I, rhythm II and lead) had their own independent gain and master controls, while the 'Simul-Class' switch, in the words of the manufacturer, meant that 'one extracts the juice of Class A sweetness while the other delivers the high-power punch of pentode Class AB'. You can literally flip a switch and change from a pristine jazz sound to heavy rock riffs.

ORANGE
OR-120 (1975)

Orange managed to shake off the 'fragile' tag their Matamp link had saddled them with and, by the mid-'70s, was being used by many working bands; Wishbone Ash, for instance, graduated to playing auditoriums and stadiums in the States, giving priceless exposure to the company that Cliff Cooper founded in the late '60s.

Not only did Orange advertise themselves in a live situation through their bright fabric covering, visible even from the cheap seats; the brand flourished in an era when PA systems were relatively puny and much of the guitar sound generated by the backline needed to be projected to the audience. Wishbone's Ted Turner and Andy Powell would use two OR-120 tube heads, each outputting 120W, run through four Orange cabinets. They upgraded the speakers to JBL K120s, which Powell found a potent combination: 'You had to play incredibly accurately – they weren't forgiving, like Marshalls with that fuzz, that distortion.'

In the exact reverse of the Fleetwood Mac situation, Andy never used Orange in the studio, preferring old Fender tweed amps. But when Oasis took up the Orange mantle in the '90s and used the brand on their first two groundbreaking albums, it was clear this British brand was very much still alive and kicking.

PEAVEY
5150 (1992)

It hardly needs to be said that this all-tube guitar amp was built to the specification of one Edward Van Halen. It was arguably the first amp ever to receive a huge amount of hype, and it's to the 5150's credit that it was able to live up to expectations.

With 120 Watts pumped out of an amp with gain to spare, its overdrive channel helped the 5150 gain a reputation for a sound that defined a generation of rock guitar tone. Five 12AX7 preamp valves and four 6L6GC tubes in the power amp combined to create creamy distortion; Eddie famously looked for a 'brown sound' resembling the horns his musician father used to play, and this amp delivers the goods in bucketloads. Presence and resonance switches help shape the whole sound of the amp on both lead and rhythm channels.

Robb Flynn from Machine Head has owned a 5150 for two decades and rates it as 'one of those magical heads you come across in your life that stands head and shoulders above the rest'. It's so precious it never tours with him.

While Van Halen and Peavey decoupled in 2004, the name of the model was changed to Peavey 6505 and it remains in production today as part of a whole 6505 series of heads, cabs and combos. The fact that it still shows up in many a 'best amps for metal' poll suggests that, while the designation may have changed, the quality hasn't.

ROLAND
Jazz Chorus (1975)

'Valve good, solid-state bad.' That was accepted opinion among guitarists until the Jazz Chorus arrived from Japan in 1975. The name was derived from effects options that, as well as chorus, also included vibrato, reverb and distortion. Each channel had a three-band EQ and volume, while high and low inputs and a bright switch completed its spec. Two 60-Watt power amps ran in stereo through two 12" speakers, allowing true stereo chorus. The result was a heavy unit, sensibly equipped with castors.

With Marshall and Fender unaffordable by punk/new wave standards, the cheaper Roland combo was adopted by the likes of Andy Summers and Steve Diggle of the Buzzcocks, while Robert Smith of the Cure used the less often seen JC-160 with 4x10" speakers. Bluesman Albert King and jazzer Pat Metheny favoured it in the States while, less predictably, Metallica's James Hetfield and Kirk Hammett would later adopt it for clean tones.

In truth, it's that clean tone, not the effects, that make the Jazz Chorus a winner; the distortion is poor by today's standards while the chorus is one speed, one depth, one sound – albeit a classic one.

It might not have been predicted 40 years ago, but the Jazz Chorus has stood the test of time. Quite simply, it's the ultimate clean amp and a more than decent pedal platform.

SESSION
Sessionette 75 (1980s)

The first amp to bear the Session name, the 15:30, emerged from Stewart Ward's garage workshop in 1979, and was one of the first 'boutique' combos. A simple 30W valve amp, it was intended for session players, hence the name – but the product that put Ward's one-man business on the map was the Sessionette 75. Produced between 1981 and 1988, it offered 75W of power as its name suggested, and sold an estimated 55,000 units – the first UK transistor amp to make a mark internationally.

Ward believed the way forward was to mimic the high-impedance tone circuits and signal paths of valve amps, but replace the valves with Texas Instruments chips. He compared his results with a Fender valve amp, fine-tuned accordingly, and the result was the Sessionette. It was not only adopted by top session men like Geoff Whitehorn and Jerry Donahue but also found a market in pub-band guitarists who were happy that such a great sound came out of a portable box.

Unfortunately a combination of bad economic conditions and aggressive marketing from bigger manufacturers ended the Sessionette story in 1988, though a new owner briefly changed specs before discontinuing the range. Stewart Ward has since resumed small-scale manufacture. You can hear the Sessionette in action on Eric Clapton's *August* album, while other proud owners include Dave Stewart and Mike Rutherford – who reportedly has seven!

SUPRO
Thunderbolt (1964)

Led Zeppelin were the last group of the '60s to line up the 100-Watt heads and 4x12"s on stage. Yet the amps Jimmy Page used in the studio included a Supro, a cheap US combo he employed for the first Zep album and pulled out again for the solo on *Stairway To Heaven*. Overdriving small amps to obtain a sound they weren't designed for soon became a popular ploy.

Supro had introduced the Thunderbolt in 1964 as their definitive bass combo. Its cathode-biased 6L6 output section delivered 35 Watts through a 15" speaker mounted in an open-backed cab. But the Thunderbolt did not have nearly enough power to deliver giggable bass; four-stringers who turned up the volume were doomed to disappointment.

Not only did the speaker and tubes distort, but the baffle board that held the massive speaker also vibrated. Braces across the speaker hole and on the back of the baffle board improved performance, as did a solid-state rectifier – but bass players were still not satisfied.

As a guitar amp, however, the Thunderbolt combined the heavy bottom of the Jensen speaker with the raw tube distortion bassists shunned, and – like Fender's Bassman – was soon adopted by guitarists. This is the combo Hendrix is said to have used with acts Little Richard and the Isley Brothers early in his career. It's since been reintroduced into production, but vintage Thunderbolts command high prices.

TRAINWRECK
Express (early '90s)

Former US Navy electronics man Ken Fischer formed Trainwreck Circuits in New Jersey in the early '80s, having worked for Ampeg in between times. He hand-made three basic models: the Express, the Liverpool and the Rocket, all heads that came in custom wood cabinets. Their simplicity – single channel, no master volume, no reverb, nothing that got in the way of the basic tone – made them legendary, and since Fischer's health declined in 1998 (he died in 2005) they are now real collectors' items. Mark Knopfler, Brad Paisley and Joe Bonamassa are all Trainwreck converts.

The design varied for each amp and it is possible no two Trainwreck amplifiers have exactly the same circuitry. Though all three basic models had three preamp tubes, Ken also made Express amps with EL34 or 6V6 output tubes.

Ever the perfectionist, Fischer experimented with different types of effects loops before discarding them as 'degrading sound quality [and] tonal purity'. The operating manual promised 'a warm, very controllable range of sounds', adding: 'You will immediately notice that your clean sound has more impact. Crunch chords hold together with clarity and punch, and your leads will sing, sustain, and speak like never before.' Owners were also recommended to 'polish your Trainwreck cabinet with high-quality commercial furniture polish to maintain its beauty'.

Long before boutique was cool, Trainwreck set the standard.

Photo courtesy of www.guykuykendall.com

VOX
AC30 Top Boost (1964)

The Vox AC30 was the amp that fuelled the beat boom, and has been a contender since Britain's leading guitar band, the Shadows, commissioned it in 1959. They had found the AC15 combo, a 15-Watt amp with a 12" speaker, underpowered, and at guitarist Hank Marvin's suggestion, Vox doubled this up. Said Hank later: 'I asked them to put two [AC15s] together to make a louder amp, 'cos we couldn't hear ourselves on stage for all the screaming [at Cliff Richard].'

Vox's distinctive checkerboard speaker cloth would also be seen behind the Beatles, Rolling Stones and other iconic British bands of the period. Joe Brown got his first AC30 in '61, while the Fab Four used them at Shea Stadium two years later (though no-one, let alone the band, could hear them).

The top boost (or brilliance) option was first introduced in 1961 as a circuit that introduced an extra gain stage, and had tone controls for bass and treble as opposed to the single knob of earlier AC30s. It became so popular that the controls were moved from the rear to the main control panel, combos with three tone controls being referred to as AC30TBs.

AC30 advocates over the years have include everyone from Rory Gallagher through Status Quo to U2 – The Edge has used his 1964 Top Boost on every album. They remain underpowered for live work but, miked through a PA, the AC30 still has that indefinable jangly magic.

WATKINS
Dominator (1963)

Charlie Watkins' company marketed functional instruments and amplifiers that gave many yet-to-be-famous guitarists their start in the '50s. The distinctive WEM badge would be more often seen on PA cabinets as more desirable amps came on the market, while Watkins also developed the Copicat tape echo unit; but the V-fronted Dominator 17-Watt amp with two 10" speakers, introduced in 1956, was an early British staple.

Watkins was an accordion player, and it's been suggested the triangular Dominator resembles an accordion case. When he showed the prototype to his salesman for the first time, the Homburg-hatted traditionalist exclaimed: 'I can't sell that – it's like selling big packets of cornflakes!' The last laugh was Charlie's as the Dominator sold some 25,000-plus units before production ended in 1964.

Many nascent beat groups used its multiple inputs to plug in bass, rhythm and lead guitars, so it was more than just affordable. The Dominator also titled bassist/author Mo Foster's first book, *Seventeen Watts?* – Foster was presented with the last Dominator off the production line as a reward – while Dr Feelgood's Steve Walwyn restored one to showroom condition a few years ago, as recounted in *G&B*.

A Dominator will distort nicely as the volume is increased, but in the words of our own Phil Harris, 'If you crank it up, you'll need to put a cloth around the handle to stop it buzzing!'

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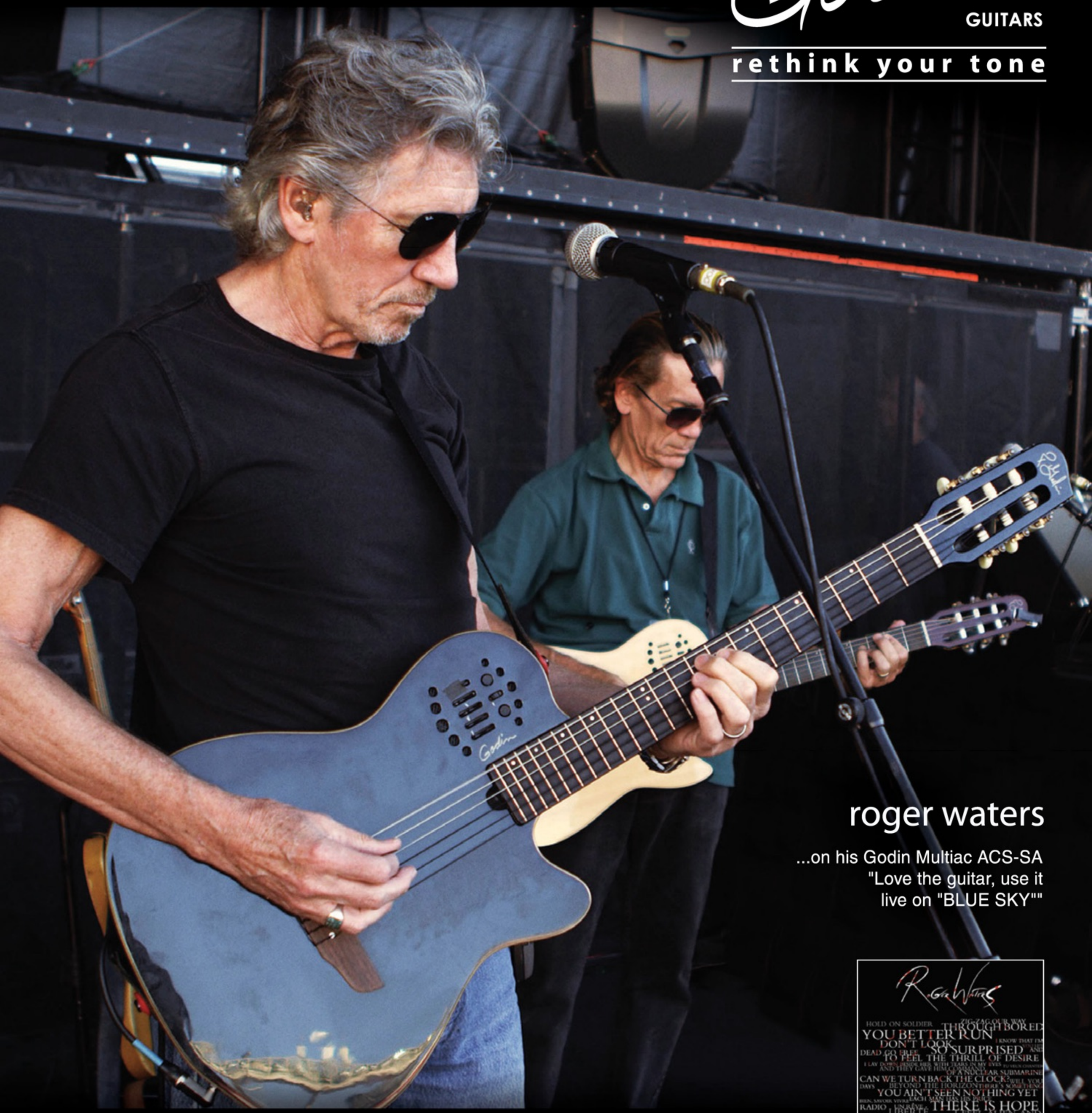

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BRIGHT
NORMAL
ON
lazy

LAZY J
20 Combo

Beefed-up Fender tweed Deluxes have been responsible for some of the most volcanic sounds in rock, and now an American in London is doing it his way. **Huw Price** reviewed Jesse Hoff's stunning debut amp in May 2010

FACTFILE

LAZY J 20 COMBO

DESCRIPTION **20W 1x12" combo with 12AY7, 12AT7, 2 x 12AX7, 2 x 6L6 and 5AR4 valves. Made in the UK**

PRICE **Basic amp £1249; with attenuator £1349; as reviewed £1599**

CONTROLS **Tone, Ch1 Volume, Ch2 Volume, Reverb level, Reverb tone/ mid boost switch, Attenuator**

CONTACT **Jesse Hoff 0843 289 4089 lazyjprojects.com**

Jesse Hoff, the man behind Lazy J, never set out to reinvent the wheel – but there must be something special about these amps, because they've found their way into the rigs of the artist formerly known as 'God', Doyle Bramhall II and noted vintage nut Phil Harris. Hoff has been a guitarist for decades and, like many players, he developed an interest in maintaining and modifying vintage amps. Eventually, he gained enough experience and expertise to become a pro amp tech. When he bought a late-'50s 5E3 Fender Deluxe he decided to turn it into the best amp it could possibly be, but soon he hit a point where further work would entail irreversible modifications to this much-loved vintage piece... so he decided to build his own instead. It turned out so well that others started placing orders. Before long Hoff had an amp business on his hands in addition to his amp tech gig at Chandler Guitars in Kew.

Hoff's 5E3 enhancements include extra volume, tighter lows, more clean headroom, mid boost switching, a built-in attenuator and valve-driven spring reverb. Arguably the most

Only one tone control, but the volumes are interactive: each will affect the sound when you're plugged into the other channel

Enhancements include extra volume, tighter lows, more clean headroom, a mid boost, an attenuator and reverb

significant factor is the selection of a Celestion Blue; none of the original-spec P12 Jensens are particularly efficient and they generally display a ratty and loose low end with a honky midrange – a very cool sound which contributes enormously to the classic tweed tone, but which does limit you. The Celestion Blue is one of the most efficient speakers – and efficiency increases the volume level, which in turn provides more clean headroom.

The power hike is achieved using 6L6 power tubes, a 5AR4 rectifier tube

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Double Deluxe
Four cathode-biased 6V6s pump up the power to 30 or 40W with either a 5Y3 or 5AR4 rectifier. Comes with two Jensen P12Q speakers
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Fender
'57 Deluxe
This is Fender's own long-overdue handwired tweed Deluxe reissue. Issued with a Jensen P12Q speaker and a non-original 12AX7 front end
RRP **£1449**

Seeley
Tweedle D
Alan Seeley makes tweed Deluxe clones and customised versions right here in the UK using selected components and valves plus your preferred speaker
RRP **from £1500**

Celestion Blue: more 'British' than you might expect in a tweed amp, but the combination works

Though supplied with 6L6s, the Lazy J will take 6V6s and a rectifier swap from GZ34 to 5Y3 without rebiasing

It can sound like a fire-breathing monster, but turn your guitar down and you'll get a sweet, sparkly clean tone

and a beefed-up output transformer. This raises the output from around 12W (depending on who's counting) to 20W. The 6L6s can be swapped out for Deluxe-spec 6V6s, and you can put in a 5Y3 rectifier for more traditional lower-wattage Deluxe tone. Conversely, you can plug the Lazy J 20 into a matching Lazy J extension cabinet if you want more volume.

Plenty of later blackface and silverface Deluxe Reverbs were modded to approximate that tweed sound, so why not add reverb to a tweed amp? An Accutronics spring reverb tank sits at the bottom of the cab, and the circuitry is housed in a metal enclosure screwed to one side. Two valves and a transformer protrude from this box, and there are controls for Reverb level and Reverb tone with a socket for the footswitch.

Tweed Deluxe-style control panels are simple: two channels, Bright and Normal, each with high and low-level inputs and a Volume knob, and a treble-cutting Tone control that doubles as a push/pull mid boost. The redundant ground switch hole accommodates a power attenuation control. This is a continually variable voltage regulator; turned fully clockwise, it's switched out of circuit.

The electronic construction is done on vintage-style eyelet board with a mixture of Sprague and Mojo Dijon capacitors. Hoff offers a bespoke service and prefers to talk to customers at length to determine the style of music and type of tone they prefer. From there, he will select components to achieve the desired result. Players who prefer a brighter and clearer tone will be steered towards carbon film resistors rather than the darker and fuzzier carbon composite type; customers can even request tremolo and select their own speakers, or they can opt not to have reverb or attenuation.

It's hard to assess the quality of the electronic construction as this amp is an early and much-modded example built to a customer's exact specifications. It's certainly tidy and workmanlike, but Hoff assured us that current production amps feature a much cleaner level of build. We have no reason to doubt this, especially after examining Hoff's high-quality finger-jointed pine cabinet. The immaculate tweed covering is about as good as it gets, and the coat of brown-tinted lacquer makes the Lazy J 20 look as if it's been marinating in nicotine since 1957.

Sounds

Tweed Deluxe volume controls had to go up to 12, because the first two increments don't work. The Lazy J is just the same: it abruptly wakes up somewhere between 2 and 3. By 4, overdrive is quite apparent, although you do get a touch more clean headroom through Input 2. There's no shortage of chimey treble for country twang or stinging, wiry blues sounds, and you can roll back the Tone control for a woodier, smoothed-over sound. What else can it do? Well, what can't it do: it certainly does blues, country, slide, heavy rock and jazz. It can even be loud and clean if you use the second volume control like Neil Young (who also favours a 6L6-loaded tweed Deluxe). Try maxing out the volume control on whichever channel you're plugged into, then turn up the other volume until it hits the point where the output starts to cut out. With your guitar volume full, the Lazy J will sound like a fire-breathing rock monster. You can turn your guitar down a notch or just play softer, and you'll have the most sweet, sparkly clean tone you can imagine with hardly any drop in volume. With the Lazy J extension cab plugged in, this proved easily loud enough to use alongside a drummer.

The reverb integrates superbly with the overall tone, adding just a hint of hanging tail or a big ambience. It never dominates or swamps the dry sound, and the reverb tone control is a welcome extra feature. However, the reverb does get slightly overshadowed at higher gain levels.

I preferred my single-coil guitars with the Lazy J's mid boost engaged, but they're twangtastic without it too. For home use or jamming with an acoustic, the attenuator did a fine job without altering the spookily responsive playing dynamics or the nature of the overdrive.

Verdict

Regular readers might have noted that my main amp is a '51 Fender Deluxe. After much experimentation, I've finally settled on a Celestion Blue with a GZ34 rectifier. I tend to play with a reverb pedal, and lately I've been thinking about attenuators because the amp is too loud to crank up at home. I mention all this so you'll understand why I'm so enthusiastic about the Lazy J 20. Despite the paucity of controls, this deceptively versatile amp can be pretty much anything you'd want it to be. It retains everything that's great about vintage tweed Deluxes, but there's no honky boxiness and it's a clearer, louder and infinitely more usable amp for modern applications. This could be the ultimate 5E3-inspired combo – and I really can't fault it.

FINAL SCORE

LAZY J 20 COMBO	
Build quality	**19**/20
Versatility	**18**/20
Sound	**20**/20
Value for money	**20**/20
Vibe	**20**/20
TOTAL	**97%**

"These Phosphor Bronze strings have
just the right amount of body and twang –
which is vital for my sound.
I give them a hard life and they still sound great."
- Newton Faulkner

Photo Credit: Jordan McLachlan

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ELX-259-R2-ADV-EN-SEP14

TONE ALONE

Build your own valve amp: Pt 1

THE RESPONSE TO THE G&B/CORNELL AMP-BUILDING project some years ago was phenomenal. But even if you never did bag one of those limited-offer Stinger kits, you can follow the assembly procedure in these pages and hone your skills ready to create your own version, as custom amp builder and designer **Denis Cornell** guides you through the amp's construction in a special two-part Amp Workshop...

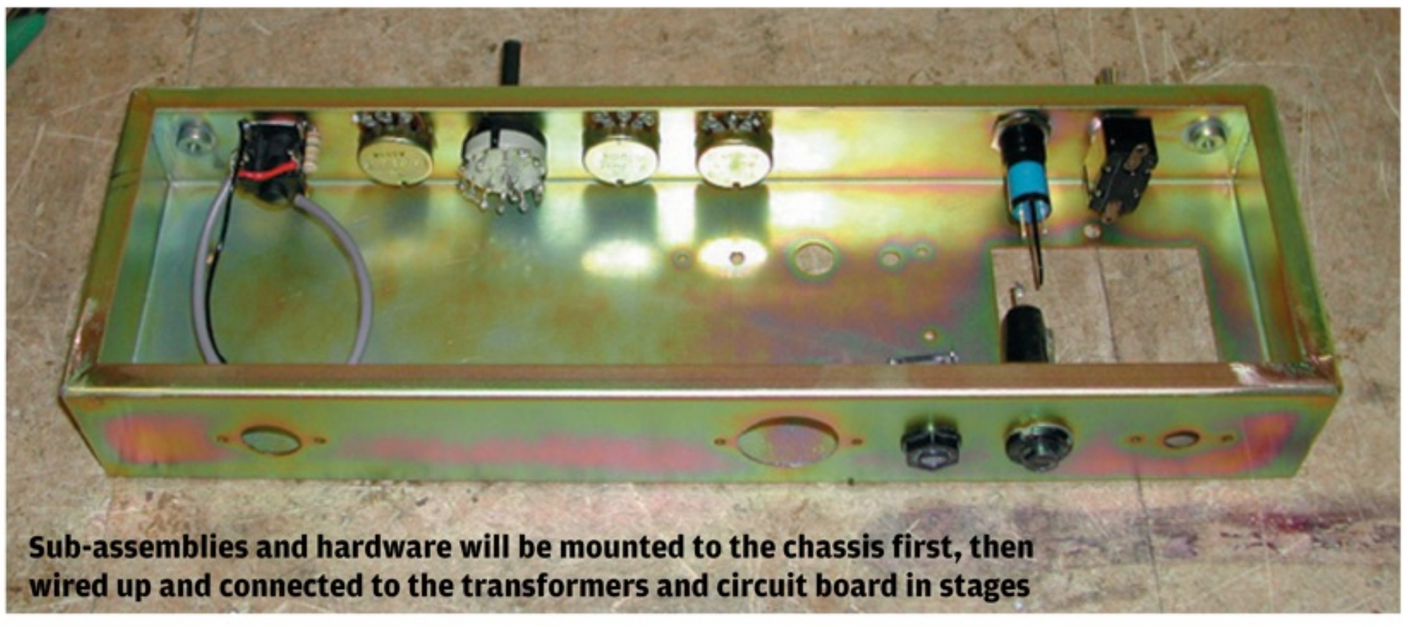
Whether you're building this amp yourself or just following along to learn how a simple valve amp is made, we hope you'll enjoy this project. The parts that make up the kit are all quality components, some (like the transformer set) designed and commissioned for this specific project, and the final result – with time and care applied by you to the assembly process – should yield a compact combo approaching boutique standards. With input from the *Guitar & Bass* staff, I've designed the Stinger to be a 10-Watt single-ended class-A valve guitar combo with a 10" Jensen C10Q speaker. It's a relatively simple circuit designed to capture the best aspects of smaller vintage amps from the '50s and '60s, with some modern touches for safety and efficiency.

To that end, there's little to get in the way of your guitar sound and pure tube tone: just a single volume control, dual tone controls (bass and treble), a single 12AX7 preamp valve and a 6L6GC output valve, plus a unique Cool/Cookin' switch which enables you to bypass the amp's tone stack for extra gain. Set to Cool the amp approaches a 'blackface' Fender Champ sound but with more guts and sparkle; on Cookin' it steps back a generation to a hotter, more 'cranked tweed' type of sound. It's loud enough for rehearsals and possibly some small gigs, but ideal for home or pro studio recording – and of course great bedroom noodling!

But beyond the perks of the amp itself, this project offers the opportunity to try your hand at building a genuine tube amp, completing all the electronics work yourself, and enjoying that feeling afterwards that the great-sounding combo you're playing is a piece of gear that you built.

We'll be detailing all components and hardware, along with detailed instructions and layout diagrams. For the sake of brevity, full instructions on sub-assemblies included in the original kit are not printed in these pages – but these articles should give you a thorough (vicarious) look into building the Stinger, and probably even enough info for an experienced DIY valve amp builder to design and complete something similar themselves.

This article, Part 1, shows you how to assemble the hardware onto the chassis and wire up the components. In the next part (starting on page 66) I'll show you how to assemble the components into the eyelets on the specially designed circuit board and wire the board into the chassis, which will then be



Sub-assemblies and hardware will be mounted to the chassis first, then wired up and connected to the transformers and circuit board in stages

mounted into the amp cab. Part 2 will also explain how to make connections from the circuit board to the hardware mounted on the chassis, so don't be concerned if a piece of hardware is not fully wired up by the end of this instalment.

BUILDING REQUIREMENTS

Building the kit will require some basic tools such as screwdrivers and spanner sets, a soldering iron and solder (not a soldering gun), and some basic knowledge of electronics. It will also require a suitable workspace in which to build it! Do not allow children to have access to the components at any time. If you don't have a private room to assemble the kit, make sure your workplace is at no time left unsupervised: some components may be a danger to life (small resistors and capacitors in particular can look like sweets and may present a choking hazard to young children), and a soldering iron can burn skin severely.

It's a good idea to read all instructions thoroughly before beginning any step, and re-read each individual part in advance of beginning an element of assembly to find what can be prepped in advance to ease the job (for example, it will help to cut wires to length, strip and tin each end – including shielding, where used – as you begin each sub-assembly; also, when more than one wire will be connected to the same component pin or tag, it's best to place all stripped wires into the un-soldered tag first, then solder them into place together).

WARNING!

This amplifier and the hardware related to the project have components utilising extremely high voltages; if these products are mishandled or used carelessly or for improper purposes, this may cause serious injury and even present a danger to life. As explained in *Guitar & Bass* when the kit was first offered, readers with no previous experience of working inside tube amps and of the safety procedures this requires should not attempt this project (or should take the kit to a qualified professional to build). To prevent any possibility of accident or personal injury we ask that you fully comply with the following:

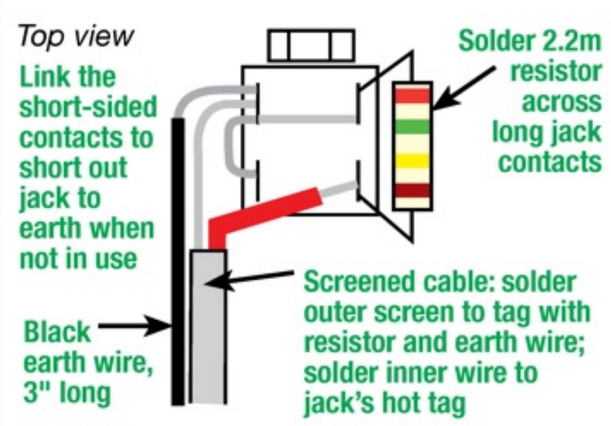
1) If the amplifier does not work after the initial switch-on – or does not function correctly – under no circumstances attempt to find the cause yourself.

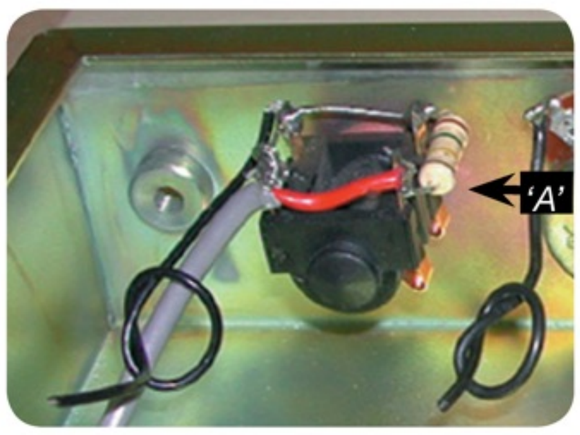
2) There is no danger of electrocution in this kit during assembly: hazard of electrical shocks exists only after plugging in and subsequently switching on the completed amp. In the event of the completed amplifier failing to work please contact a qualified amp technician.

3) *Guitar & Bass*, its staff, Anthem Publishing, DC Developments or Denis Cornell can take no responsibility for injury to any person or persons caused by misuse, negligence and/or failure to comply with the guidelines set out in 1 and 2 above.

Diagrams 1a, b & c: Sub-assemblies

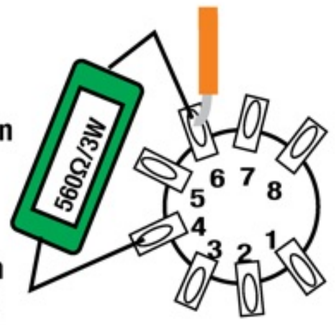
A: Input jack





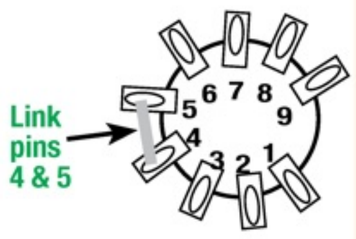
B: 8-pin octal valve base 2

Pin connections:
pin 1 not used
pin 2 heater connection
pin 3 anode (to output trans)
pin 4 screen grid
pin 5&6 no connection (6 used as a mounting tag here for pin 4's 560Ω/3W resistor)
pin 7 heater connection
pin 8 cathode (to circuit board)



B: 9-pin B9A valve base 1

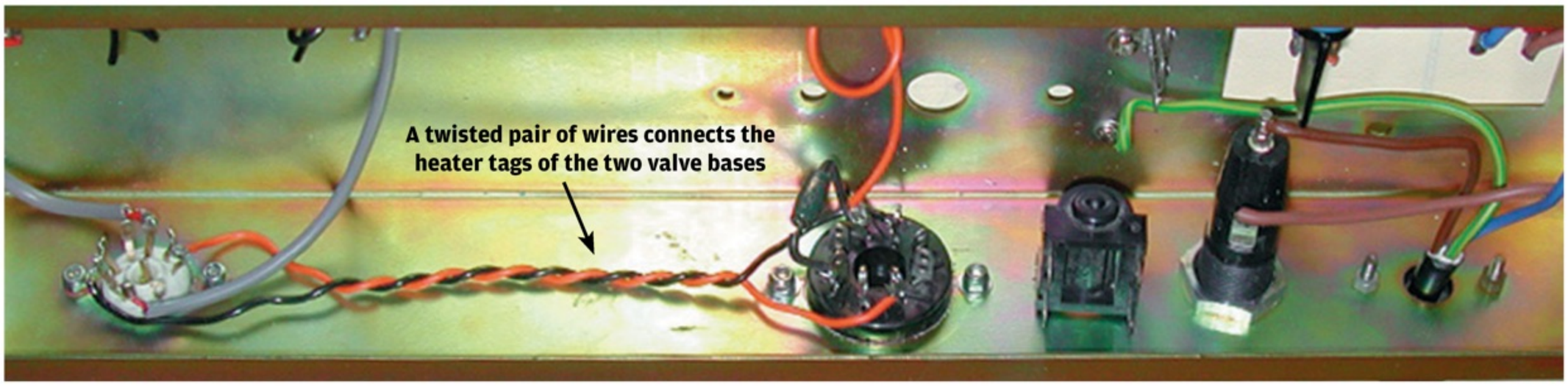
Pin connections:
pin 1 anode one
pin 2 grid one
pin 3 cathode one
pin 4 & 5 heaters
pin 6 anode two
pin 7 grid two
pin 8 cathode two
pin 9 heaters



STAGE ONE: CHASSIS ASSEMBLY

The Stinger kit's sub-assemblies are packed in individual bags containing the components used in each. Build these sub-assemblies first, then mount them along with the other hardware onto the chassis (see diagrams 1 & 2 – full instructions for completing this are not included here, but many of the diagrams are self-explanatory).

Affix the valve bases to the chassis using the self-tapping screws supplied. Place the valve bases with the pin gap (the space between first and final pin) facing the transformer end of the Chassis. The eight-pin octal valve base also has a valve retainer spring bolted to the chassis, so don't forget to screw this down at the same time. After the hardware has been assembled and wired up, fit the transformers and earth tag strip. With all the sub-assemblies and hardware mounted to the chassis, we are ready to make some connections.



SUB-ASSEMBLY ONE

Solder the inner (hot) strand of the input jack's screened cable to pin 7 of valve base 1 (this is your 9-pin 12AX7 socket). The outer screen is not soldered at this end. Remember that this wire will travel under the component board so do not make the cable tight (keep it about 4" long to leave some slack).

SUB-ASSEMBLY TWO

Locate the volume pot (1meg A log). To pin 1, solder a black earth wire cut 3" long; this will be connected to the component board later. Wire the pot's centre pin to tag B on the Cool/Cookin' switch using the yellow wire (see Diagram 3). Pin 3 will be soldered to the component board later.

SUB-ASSEMBLY THREE

Connect pin 1 of the Cool/Cookin' switch to the centre pin of the treble control using the yellow wire (see Diagram 3). Connect the inner (hot) of the screened cable to pin A and the outer (earth) to pin 6 of the Cool/Cookin' switch. Cut the screen cable to about 4" long.

At the other end of the screened cable, connect the inner (hot) screen cable to pin 2 of valve base 1. The outer is not connected at this end; remember to leave enough slack for this cable to travel under the circuit board, to be mounted in Part 2.

TONE POTS

Connect pin 1 of the treble (470k B linear) pot to pins 2 & 3 of the bass pot (470k A log). Link pins 2 & 3 together. Connect an 80p capacitor between pin 7 of the Cool/Cookin' switch and pin 3 of the treble control (as shown in Diagram 3).

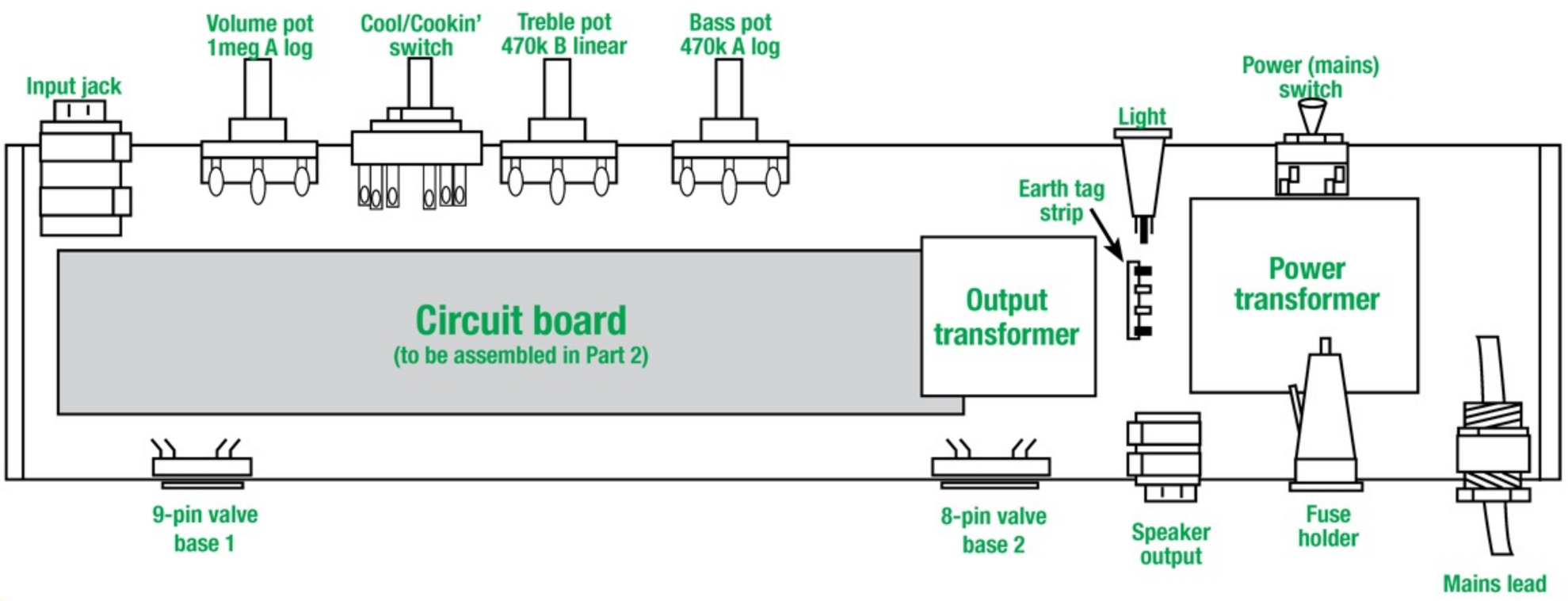
VALVE BASES

The twisted pair of black & orange wires are used for the heater chain; connect the black to pins 4 and 5 of valve base 1 (strip enough shielding from the end of the wire to run bare wire through pin 4 to pin 5, then solder at both pins). Connect the orange wire to pin 9 of valve base 1.

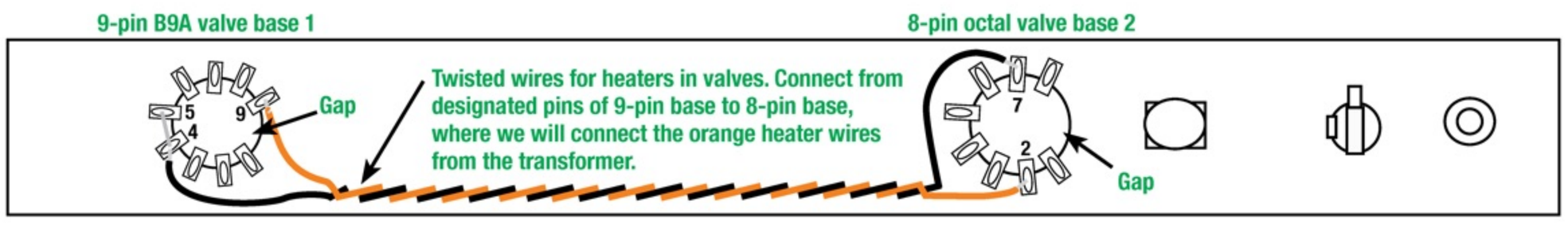
The other ends of these wires connect to valve base 2. Connect the black wire to pin 7 and the orange wire to pin 2 of the eight-pin octal valve base. The orange wires coming from the transformer will go to these connections – connect one orange wire to pin 2 and the other to pin 7 of valve base 2.

Diagram 2: Component hardware layout

Overall view from above



Top view of bottom panel



EARTH TAG STRIP

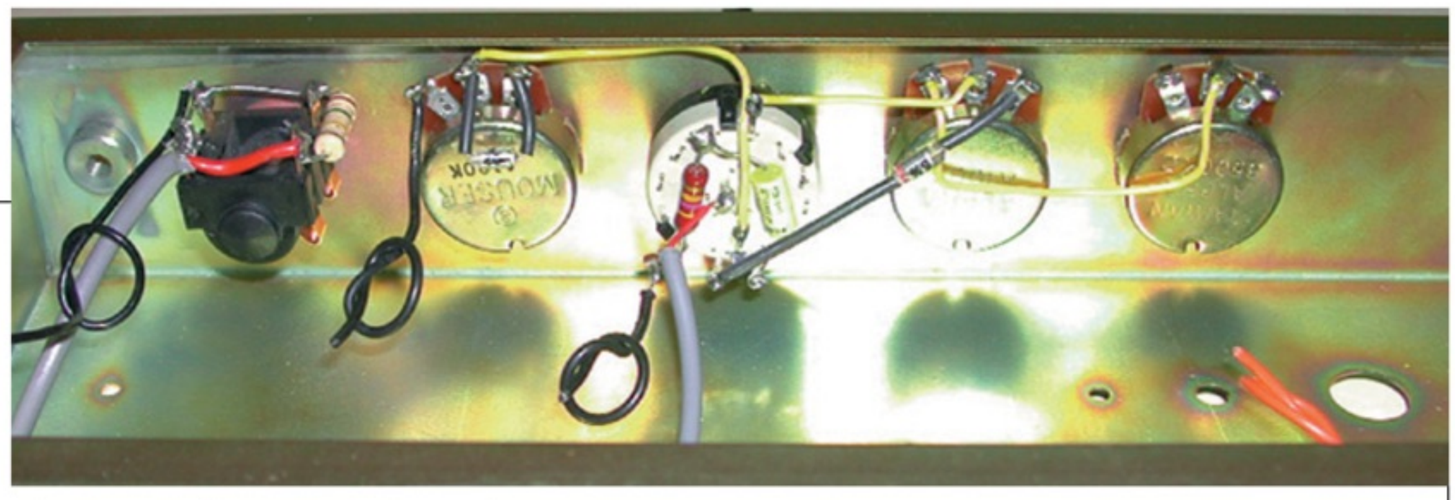
Bolt the earth tag strip to the chassis and link all four tags together with stripped wire. This will be our main earth connection point and it will contain the earth returns from the component board. When you have bolted the mains transformer onto the chassis, connect the green/yellow earth wire and the black wire to this earth tag strip. Note that the green/yellow earth wire in the mains lead is bolted separately to the chassis on an earth solder tag (see Diagram 4).

TRANSFORMER MOUNTING

Before continuing with the wiring up, it will be helpful to mount the transformers. The mains or power transformer (PT) is of the 'drop through' type, which has one side exposed, from which the various coloured primary and secondary wires run. Remove the mounting nuts from the two bolts, one either side of this exposed area, and position the PT with these bolts extending through the holes drilled in the chassis, centred at the top and bottom sides of the square cut-out. Be sure to orientate the chassis so the blue, brown, red, black and green/yellow wires (primary mains and screen connections) are towards the mains switch and the large orange heater wires and yellow secondary wires are towards the fuse holder.

The output transformer (OT) is a 'stand off' type mounted on the bottom of the chassis, which attaches to four pre-drilled holes. Orientate it so the black and red primary wires pass through the top hole (drilled between the top bolt holes) and the blue and grey secondary wires pass through the bottom hole, then bolt it in.

Once the transformers have been mounted, you can rest the chassis on your workbench on the larger PT for further work, but will need to bolster it up by placing books or wooden blocks under its opposite end to level it off; be sure to create a steady and wobble-free work surface!



First-stage wiring of the Stinger's input, volume and tone controls (above) and the results (below)

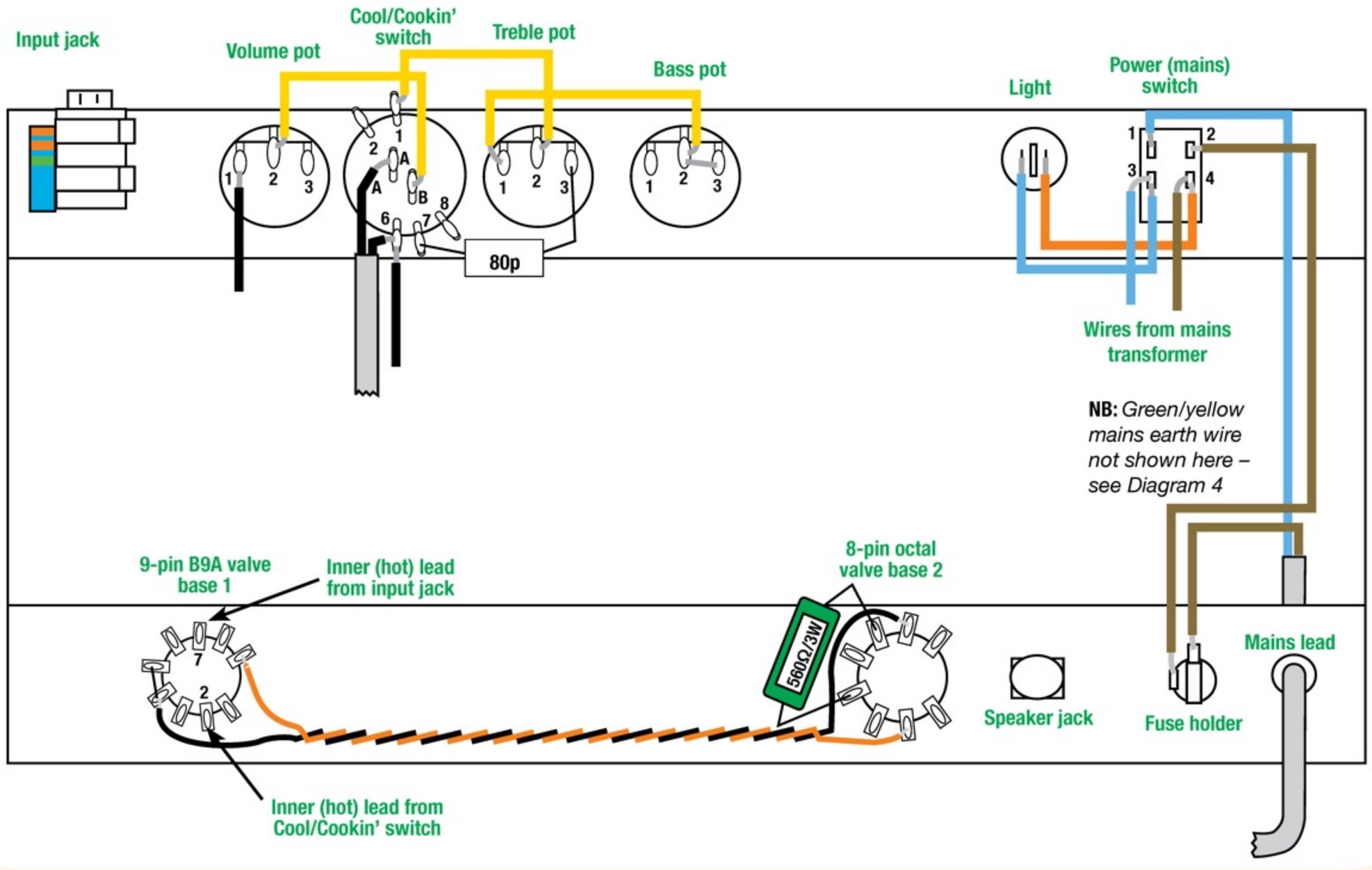
MAINS WIRING

Push the mains cable through the clamp that is bolted to the chassis. Strip back enough cable so the neutral (blue) wire can be connected to the mains switch on the front panel (see Diagram 3).

The green/yellow earth wire is to be bolted to the chassis. Strip, tin and solder the wire to the solder tag supplied, then bolt it to the chassis, using the hole in line with the earth tag strip. Note: it cannot be stressed enough that the chassis must be connected to earth. The green/yellow earth wire in the mains ➔

Diagram 3: Component hardware layout

'Flattened out' view of top and bottom panels



cable is the only path back to ground. (see Diagram 4).

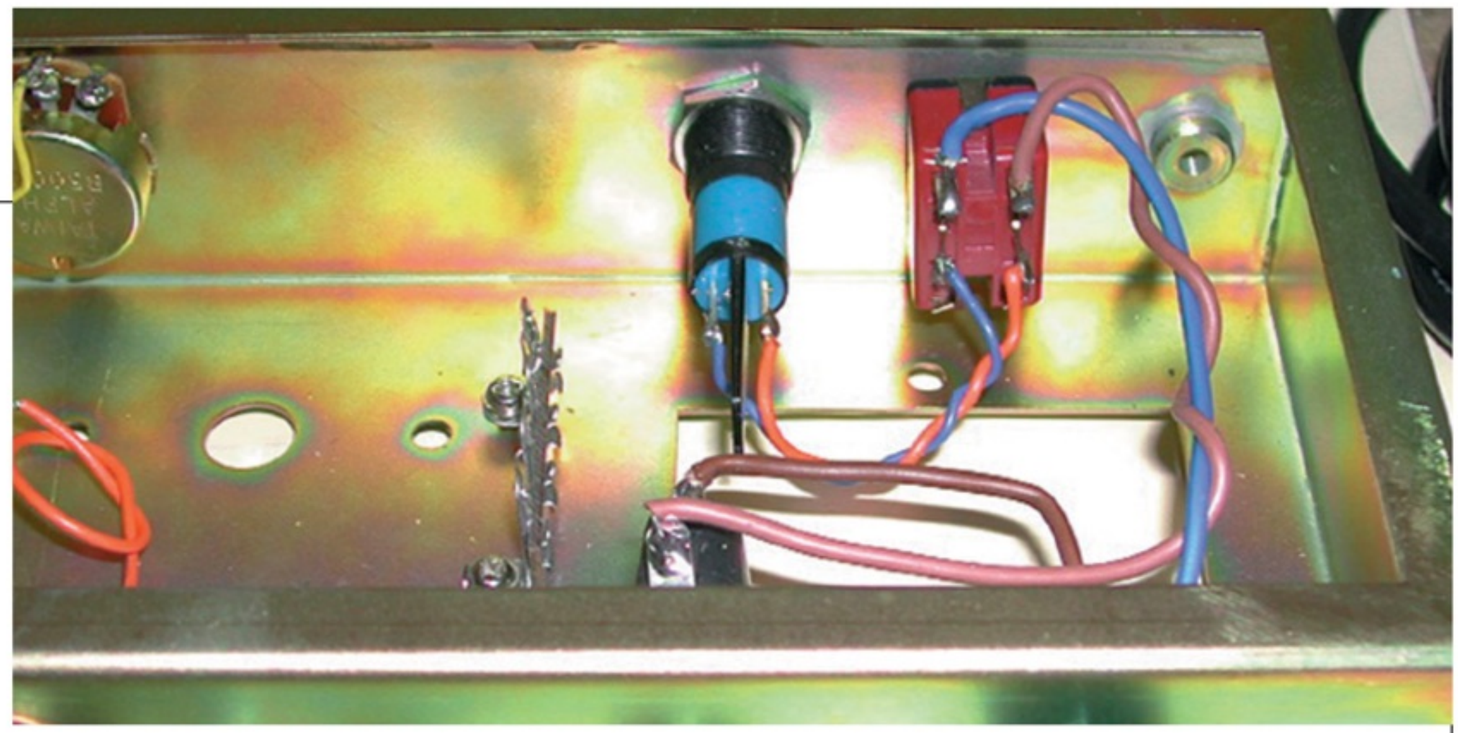
FUSE HOLDER

The brown (live) wire from the mains cable goes through a fuse before being connected to the mains switch. Connect the brown wire to one pin of the fuse holder and connect another brown wire from the other side of the fuse holder to the mains switch. (It does not matter which way round the fuse pins are connected.)

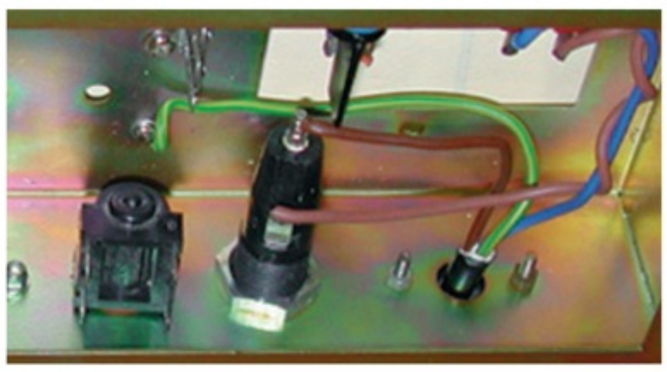
MAINS SWITCH & LIGHT

The mains on/off switch has four tags on it. The switch should be mounted to the chassis with the two tags 1 & 2 (closest to the edge of the switch) positioned facing the top (outside edge) of the chassis. These top two tags are our mains connection: connect the blue (neutral) wire from the mains cable to tag 1, and the brown (live) wire from the fuse holder to tag 2.

The two tags underneath in the centre of the switch (3 & 4) are the connection to the transformer and pilot light. Keeping the coloured wires the same – blue to tag 3, brown to tag 4 – connect these tags to the transformer (see Diagram 4) without soldering, then to the light, and then solder in place.



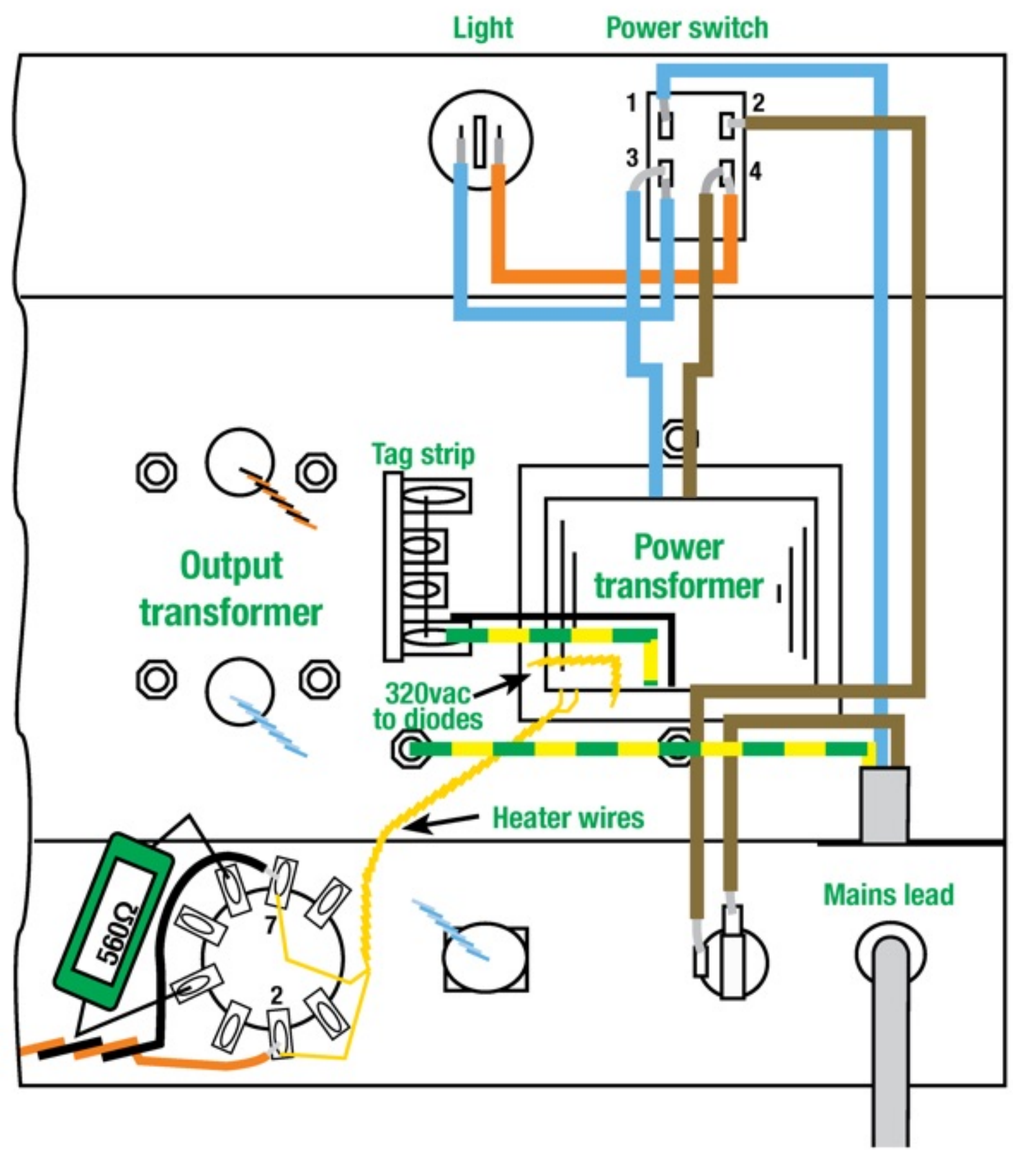
Power arrives through the mains cable, below, and travels via the fuse to the power switch, above



SPEAKER OUTPUT

When the speaker jack is fixed to the chassis, the contacts close to the chassis (ie: nearest the jack's input hole) are the earth contacts. Connect the grey wire from the output transformer with a black wire to the earth contacts on the jack. Cut the black wire about 4" long. Connect the blue wire from the output transformer to the other (live) contacts on the jack.

Diagram 4: Transformer wiring



CONNECTIONS

Power Transformer		Output Transformer	
Brown/blue	240vac input	Black	to pin 3 of 8-pin valve
Yellows	HT 320vac output	Red	to HT on circuit board
Orange	LT 6.3vac output (heaters)	Blue	to speaker jack hot
Black	Earth	Grey	to speaker jack earth
Green & yellow	Earth		

OUTPUT TRANSFORMER

There are four wires from the output transformer; the 'primary' winding is connected to the output valve. Connect the black wire to pin 3 of the output valve and the red wire to the HT connection on the component board. This will be shown in the next part of the project.

The secondary winding is the output to the speaker. Connect the grey to the earth contact on the output jack and the blue wire to the live contact.

POWER TRANSFORMER

The PT contains eight coloured wires; their connections are as follows:

Primary winding (mains 240-Volt input): Brown = live; blue = neutral. The brown and blue wires are connected across the mains switch (middle tags).

Secondary windings (output feed to valves): The two yellow wires are the 320-Volt AC. These are connected to the rectifying diodes on the component board, which will convert the current to DC. The two thick orange wires are the 6.3-Volt AC heater wires, and are connected to the octal valve base pins 2 & 7 (see Diagram 4).

The black wire is the centre tap of the heater winding and is connected to the earth tag strip. The green/yellow wire is the screen connection to the transformer and should be connected to the earth tag strip.

For Part 2 of the project – completion of the Stinger kit by building the circuit board, completing the wiring connections and mounting the chassis into the amp cab, plus a parts list – turn to page 66.

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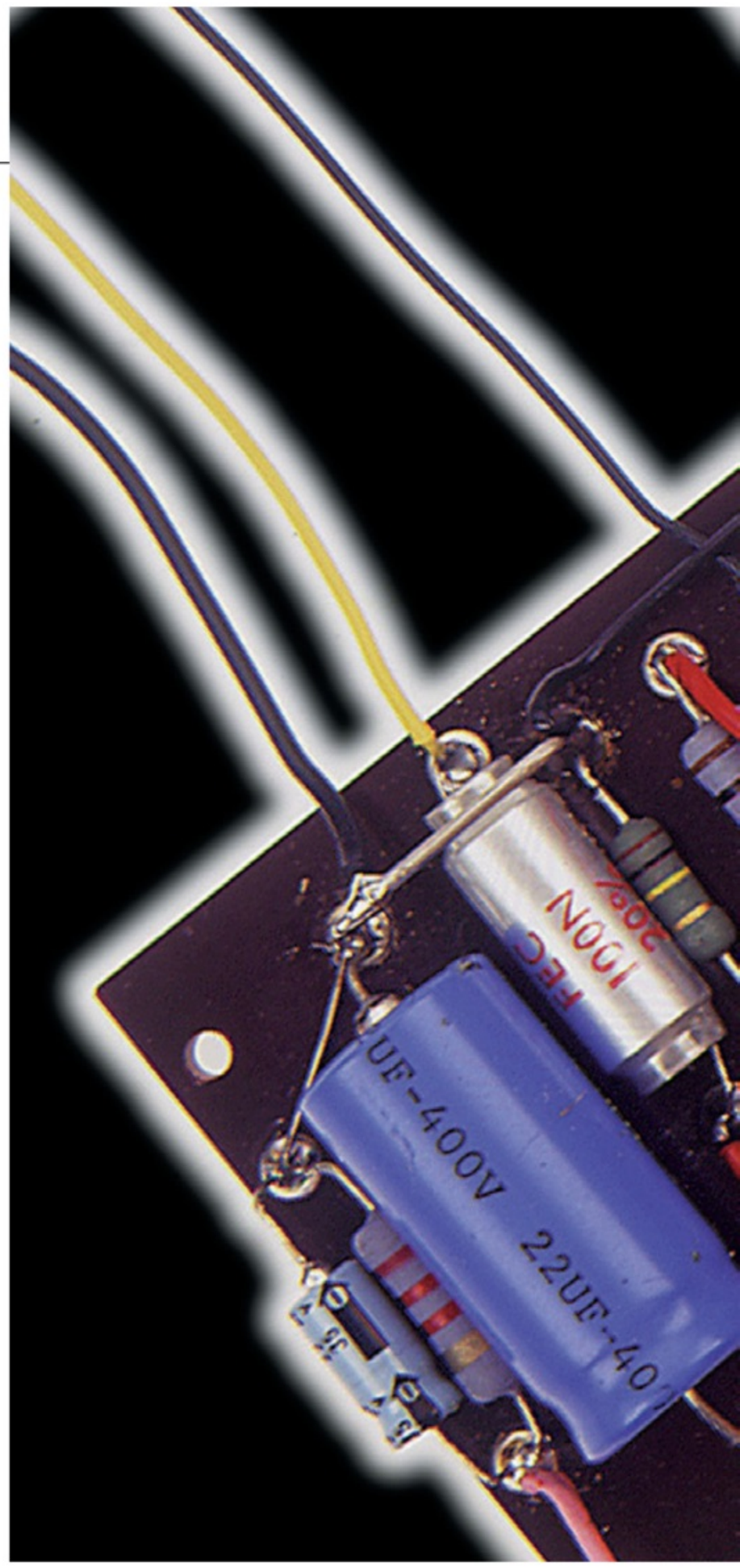
TONE ALONE

Build your own valve amp: Pt 2

WITH THE CHASSIS COMPONENTS, HARDWARE AND transformers all bolted together, it simply remains to assemble the brains of the amp - the circuit board - then complete the connections, and mount the job into the cab. Voilà - Stinger ahoy! **Denis Cornell** guides you through the completion of the *G&B* kit project...



You're approaching the home stretch, and by now you've probably realised how simple the construction of a good, classic valve amp can be – once you've got a good design, the correct components and the instructions to carry you through.

Before we proceed with circuit board assembly, however, a word about construction technique. When placing the components in the eyelets, do not bend the component legs over into a hook shape to hold them in; support the rear edge of the board high enough to allow the component leg – bent to a right angle only – to suspend, then solder it/them in the eyelet. This will allow easy release of the component at a later date should there be a mistake (especially when the board is fixed into the chassis). Also, if more than one component or lead goes into a single eyelet it's best to put all in position before soldering any of them, rather than fixing one at a time and having to reheat the solder to add further leads.

For components' names and positioning on the chassis, refer to the diagrams printed with Part 1.

As the eyelets are large it will take a few seconds to heat the job (in tech lingo, 'the job' is the individual unit you're working on at any moment – in this case, the eyelet and any leads placed into it). Remember the basic rule of soldering is that the job itself should be hot enough to melt the solder: don't melt the solder on the soldering iron and then try to transfer it onto the eyelet. If you're a real beginner at soldering, read some good instruction on the art before continuing and practise on some scraps before applying the heat to the real thing, as good solder joints are crucial to a functional circuit. *The Player's Guide To Guitar Maintenance* by Dave Burrluck (Backbeat) contains a good couple of pages on the subject.

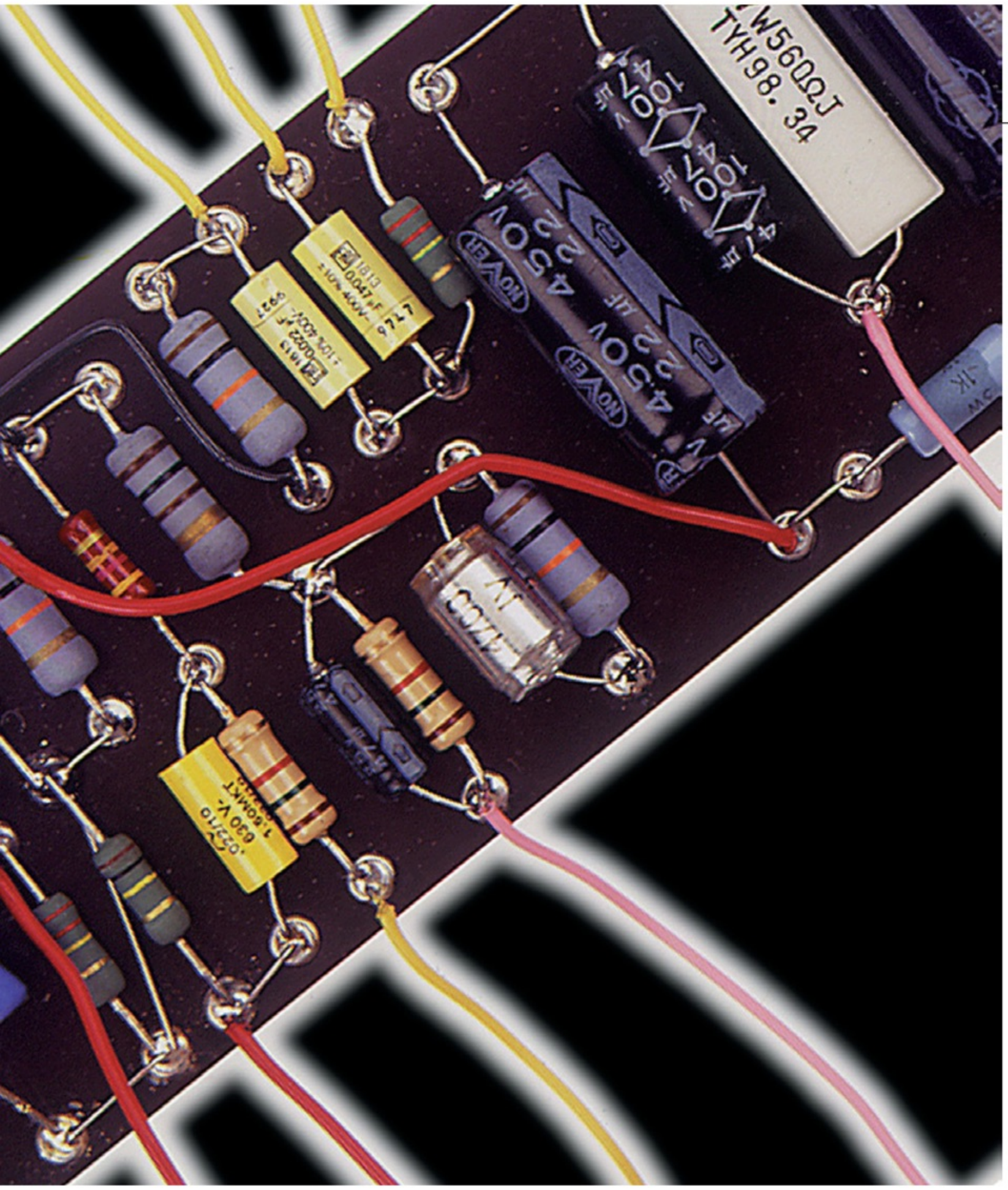
ASSEMBLING THE BOARD

To complete the circuit board you will need the components, some tinned copper wire, coloured wires, and tools including needlenose pliers, cutters, soldering iron and solder. When undertaking jobs like this it helps to have a good, heat-resistant stand for the soldering iron, preferably one that has a specially designed sponge (which you soak with water) to clean the iron's tip between applications. Place all the items close to hand on your bench/table and allow yourself at least two hours' uninterrupted time.

To start we need to be sure that we are looking at the correct view of the board. One end of the board carries four diodes; the other end has a capacitor and a resistor in parallel. Place the board facing you with the four diodes on your right (which means the left side of the board should have bare holes without eyelets in the upper and lower corner). Each diode has a silver line on it that indicates the positive end. Diodes conduct only one way and it essential that they are in correctly. Electrolytic capacitors also must be connected the correct way round according to polarity (resistors, on the other hand, are non-polarised). The component board has been laid out so that the diodes and capacitors C1, C3, C11, C10, C13, C14 and C15 face the same way round, with the positive facing you.

Use the component board layout drawing and photograph over the page to help you with identification of the components.

On the left side of the board, place C1 and R2 together into the first two eyelets (the holes above and below these eyelets in the corners of the board are for mounting the board into the chassis, as are those about a quarter of the way in from the right side). C1 is a blue electrolytic capacitor marked 22uf 35v; the arrow points to the negative end, the positive end has a ridge in the can (remember: the positive end faces you).



PARTS LIST

For the full list of resistors and capacitors see the circuit board layout diagram, as all such components are contained on the board, except: 2.2M resistor on input jack, 560Ω/3W resistor on output valve base, 80pF cap on volume pot, 2200pF cap and 470k resistor on Cool/Cookin' switch, and 80pF cap between Cool/Cookin' switch and treble pot.

Potentiometers: 1M A log, 500k B lin, 500k A log
Knobs: Fender 'brownface'-style cream barrel x4
Mains switch: 250V AC DPDT rocker
Mode switch: 6-way, 2-pole
Light: blue mains-powered pilot light
Mains cable: Eurolead with plug
Circuit board: fibre board with eyelet-mount construction
Valves: Sovtek 6L6GC or 5881, Sovtek 12AX7
Valve bases: 9-pin B9A with can, 8-pin octal with spring retainer
Fuse holder & fuse
Jacks: shorting mono jack sockets x2
Earth rail: 4-lug terminal strip
Transformers: mains and output transformers by Majestic Transformer Co of Poole, Dorset, custom wound to spec
Chassis: custom design
Hookup wire: assorted gauges
Speaker: Jensen C10Q (8Ω, 35W)
Cabinet and assorted hardware: Fender-style corner protectors, brown leather handle, oxblood grille cloth and tan Tolex covering.

NB: This list is for reference only and may not be complete in some minor details in comparison to the full Stinger kit.

Solder R2 (2k2 red/red/red) and the capacitor in the eyelets with a piece of link wire to connect the negative end to earth. Solder a 2.5" length of pink wire to the positive junction of R2/C1, which will later go to pin 8 V1b. (Hint: if you strip and tin both ends of these connection wires before attaching each to the circuit board connection point, it will make life easier when the time comes to complete the connections).

Insert the remaining components using the drawing supplied. Solder the connecting wires into the board as indicated but do not connect their other ends to valve bases, potentiometers and other components until you have completed the board and fixed it onto the chassis.

C3 links positive to R3, R4, R8 and R9 as shown on the layout.

Using a stripped piece of the thick (18swg) copper wire, make a bridge to connect R4 earth end to C3 earth end. This will be used as our signal earth return.

Then, at the junction of R3 and C2, solder a 2" length of red wire to go to the anode pin 6 V1b.

Solder a 2" length of yellow wire at the free end of C2 to go to pin 3 of the volume control.

Link R8 and C9 at the bottom of the board with a piece of bare connecting wire and at this junction connect a 1.5" length of red wire to go to pin 1 V1a anode. Solder a red wire to the free end of R9 across to the positive end of C10. Remember to link C9, R10 and R14 at the central eyelet as shown. Link the other end of R14 to R12 with bare connecting wire, then connect a black wire long enough to go to the earth tag strip (approx. 8.5") to the junction at the R14 eyelet. (These components need to be earthed separately from the signal earth 'buzz bar' bridge you built earlier, to help keep noise levels low.)

Link R6 and C8; at this junction solder a 4" length of yellow wire to be connected to pin 1 of pot 3 (the bass pot).

At the free end of C7 take a 2.25" length of yellow wire for connection to pin 1 of pot 2 (the treble pot). This should have a connection to the bass pot pins 2 and 3 from Part 1 of the project.

From the free end of R7 take a yellow wire to pin 7 of the Cool/Cookin' switch. Link the other end of C8, C7 and R7 together.

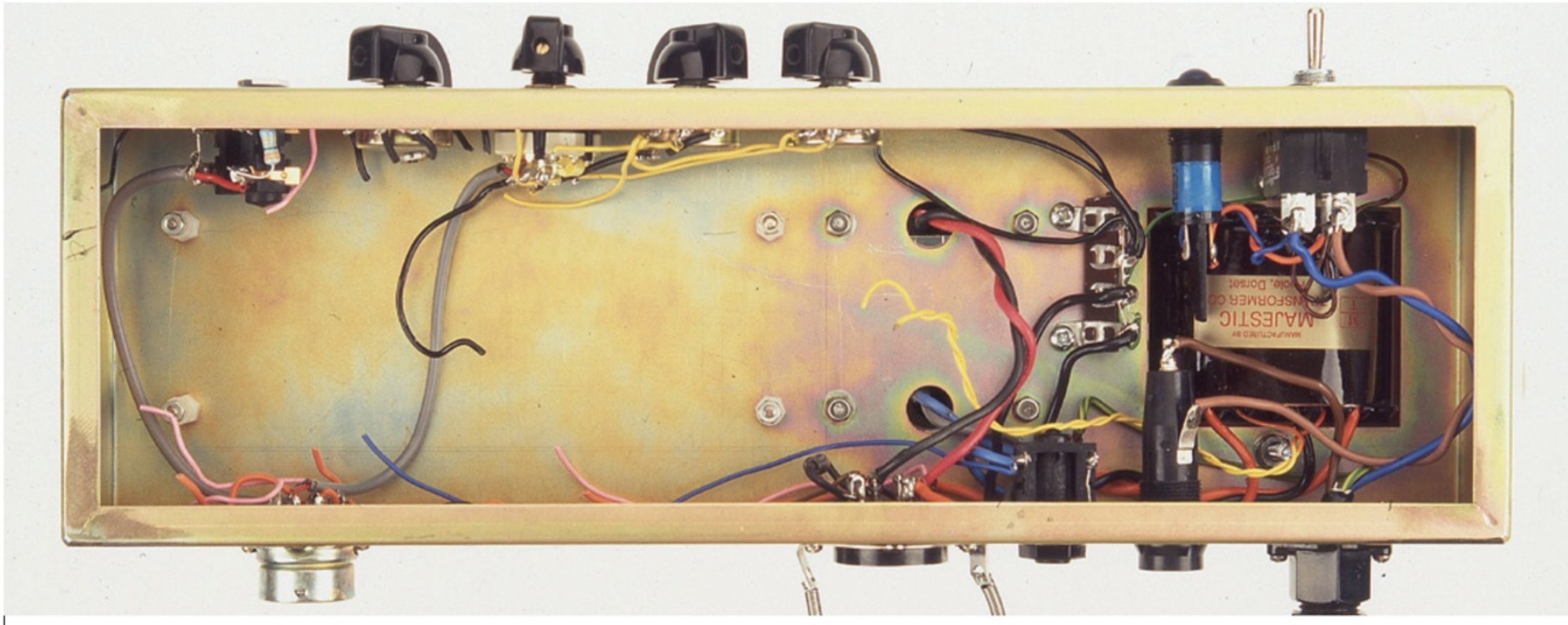
Connect a black wire to the free end of R6 and connect it to the preamp earth buzz bar.

To the free end of R10 solder a 5" length of yellow wire which will go to pin 5 V2, the output valve. Make sure R12, C11 (negative), R11, C12 and R13 are linked as shown on the board.

At the C11 and R11 free end junction, solder a 2" length of pink wire to run to pin 3 V1a. At the C12 and R13 free end junction, solder the blue wire to the output jack. Link the positive end of C10 to R17; this will be our grid connection, to pin 6 V2. Link the other end of R17 to C14 and R18. R17 is connected between C14 and C10. Link to earth the negative ends of C10, C13, C14 and C15, the upper end of R15, and the negative end of the diodes; use the 18swg tinned copper wire from C15 to the diodes. At the free end of C13 and R15, solder a 5" pink wire to go to pin 8 V2.

Link the positive end of the diodes to the positive of C15 and R18. R18 is connected between C14 and C15.

The earth connections are the preamp buzz bar, the junction of R14 and R12 ⇻



Having completed Part 1, your chassis with sub-assemblies and hardware should look much like this (though our photo includes some wires that you haven't yet connected)

and the negative end of the diodes. Cut a black wire to be connected to the earth tag strip from each of these points (you have probably already done this for the junction of R14 and R12).

After the board is fixed to the chassis, you will use the preamp earth buzz bar to connect up the earth from the sub-assembles: the black wires from the input jack sub-assembly, from pin 1 of pot 1, and from pin 6 on the Cool/Cookin' switch.

The board should now be completed. Before fixing into the chassis and wiring up the valves and other connections, look at the underside of the components to make sure there are no long wires hanging down, then cut all component wires close to the eyelet. Check the board by following the components with the circuit; also check the valve pin connections.

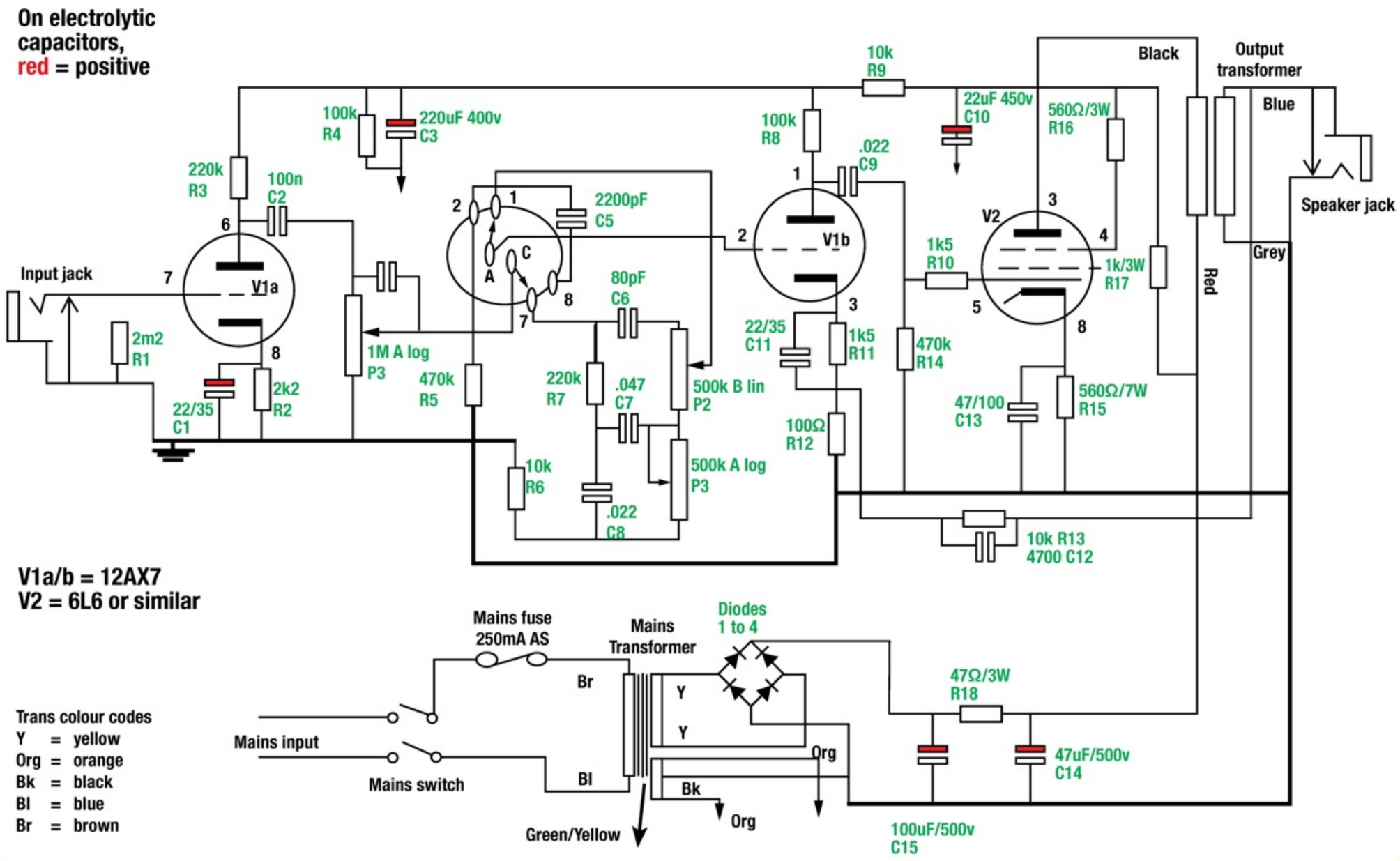
MOUNTING THE BOARD

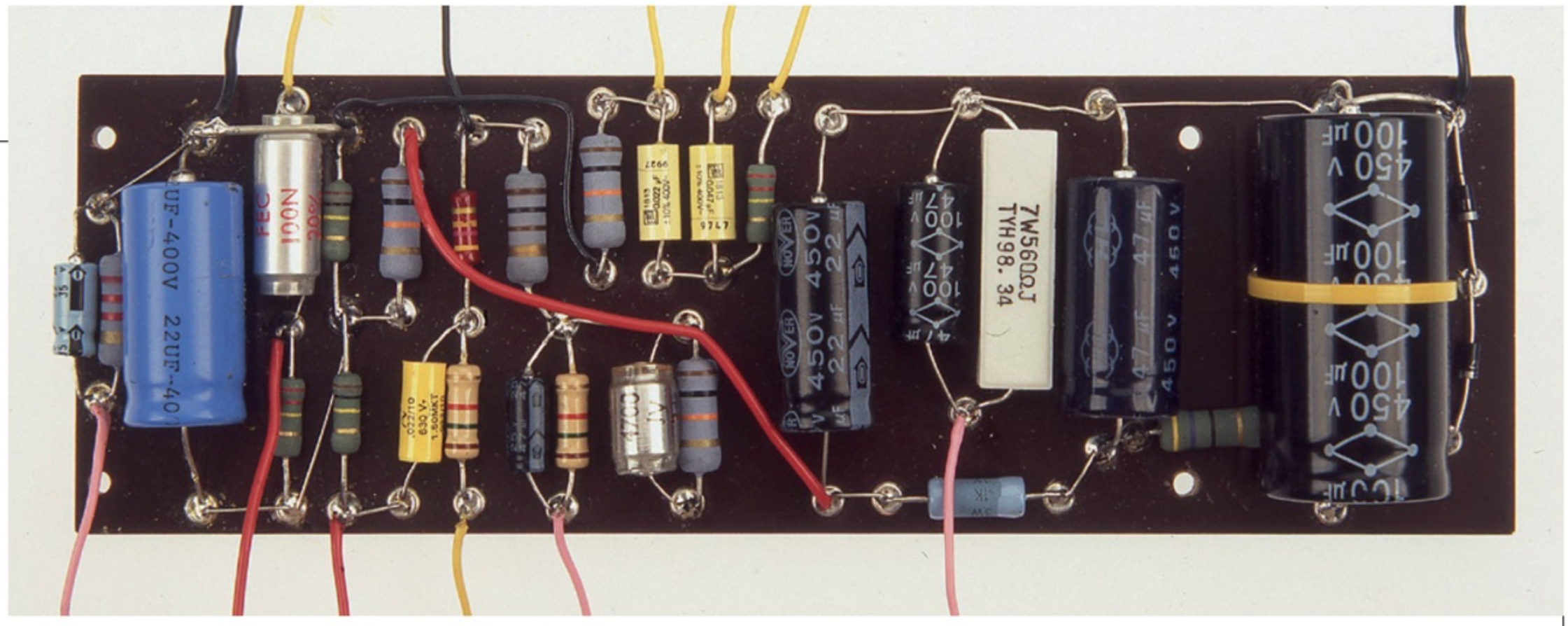
Fix the board to the chassis using small bolts and spacers (plastic spacers lift the circuit board above the metal chassis so the components don't short out). After the board is fixed into the chassis, you're ready to connect up the free wires from the valve bases and other components. While completing these connections is relatively simple, you're likely to find the operation rather fiddly due to the tight space constraints of working inside the chassis. Many builders will find it helpful to have a friend on hand to hold some wires out of harm's way while you solder others in place, to avoid melting shielding or scorching parts on the side of the hot iron.

In any case, take your time with this and be sure you've got a clear shot at the job being soldered before lunging in and melting wires that are in the way! It'll also be helpful to use your needlenose pliers to hold leads in place for soldering and keep them there until the joint has solidified, as many of these wires will heat up too much to be comfortably held in place with fingers. Off you go...

So, first the orange wire from pin 6 V2 (output valve sub-assembly) is connected to

Diagram 1: Stinger schematic Designed by Denis Cornell





Use this photo of a completed Stinger circuit board to help you locate component and connection positions when referenced against the diagram below (Note: two of the diodes at the right side are hidden behing the large filter capacitor)

the junction of C10 and R17. Next, make the output transformer primary connections: the OT's black wire goes to pin 3 V2 and the red wire goes to the junction of R17, R18 and C14.

The OT's secondary blue and grey wires should already be connected to the hot and earth tags of the speaker jack respectively. The two yellows from the mains transformer go to the centre of the diodes; take one yellow to the junction of one pair of diodes, and repeat with the other yellow to the other diode junction.

The two orange wires from the mains transformer go to pins 2 and 7 on V2. The black and the screen green/yellow go to the earth tag strip. Remember, the three black earth wires from the board must also be connected to this tag strip.

VALVE BASE CONNECTIONS

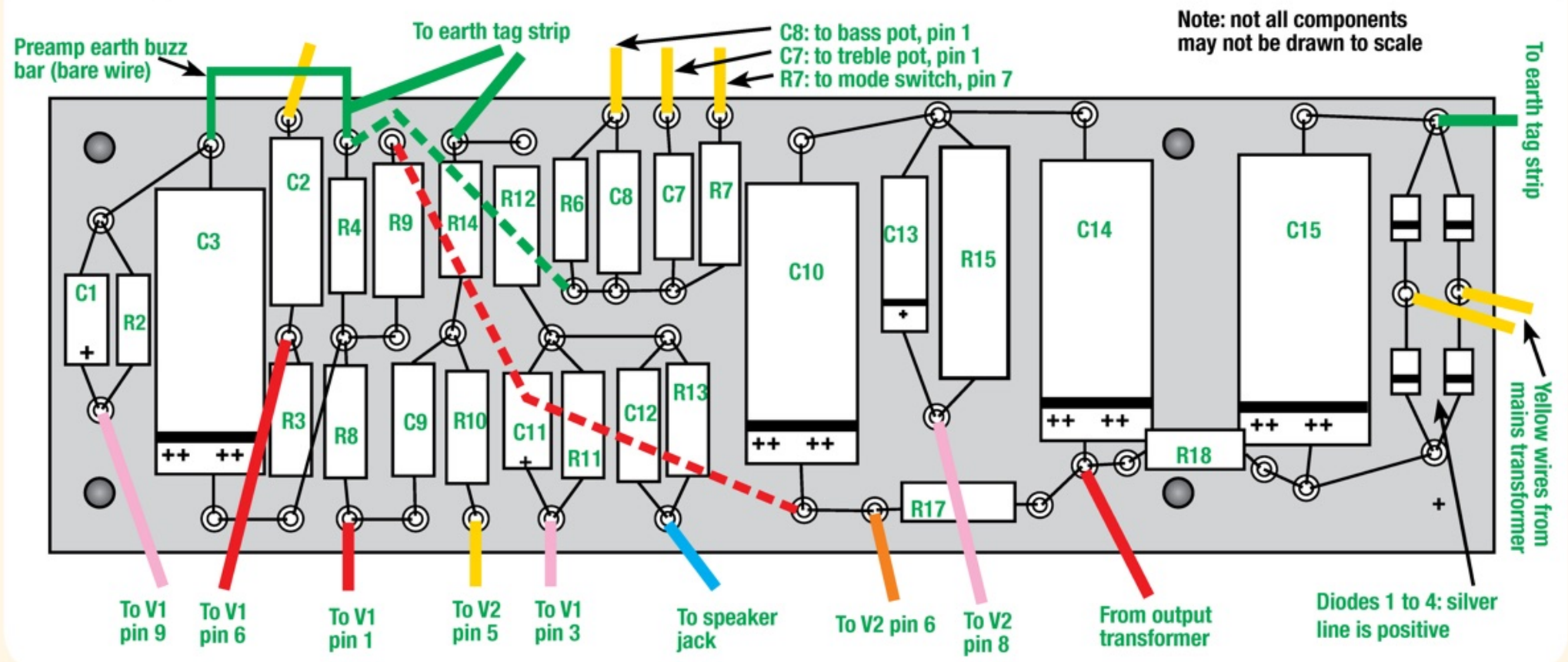
From the ECC83/12AX7 preamp tube:
Pin 1 V1a (anode) goes to the junction of R8 and C9 on the circuit board. Pin 2 V1a (grid) goes to Cool/Cookin' switch pin 'A' (you may have completed this connection already in Part 1). Pin 3 V1a (cathode) goes to the junction of R11 and C11 on the circuit board. Pins 4 and 5 V1 are joined together for one heater connection.

Pin 6 V1b (anode) goes to the junction of R3 and C2 on the circuit board. Pin 7 V1b (grid) goes to the input jack live tag. Pin 8 V1b (cathode) goes to the junction of R2 and C1 on the circuit board. Pin 9 V1b is the other heater connection.

From the 6L6GC output tube:
Pin 1 V2 output valve has no connection. Pin 2 heater connection goes to pin 9 V1 and ➔

Diagram 2: Stinger circuit board

Board layout



Circuit components

RESISTOR	VALUE & CODE
R2	2k2 (red/red/red)
R3 & 7	220k (red/red/yellow)
R4 & 8	100k (brown/black/yellow)
R9, R6 & 13	10k (brown/black/orange)
R10 & 11	1k5 (brown/green/red)
R12	100Ω (brown/black/brown)
R14	470k (yellow/mauve/yellow)
R15	560Ω/7W
R17	1k/3W
R18	47Ω (yellow/mauve/black)

CAPACITOR	VALUE
C1	22uF 35v (blue)
C2	100N 400v (0.01 silver)
C3	22uF 400v (blue)
C8 & 9	0.022 (yellow)
C7	0.047 (yellow)
C4,5,6 & R1,5,16	on sub-assemblies
C11	47uF 25v (black)
C1 2	4700 (4n7 silver)
C13	47uF 100v (black)
C10 & 14	47uF 450v
C15	100uF 450v

the mains transformer. Pin 3 (anode) has a black wire connection from the output transformer. Pin 4 (screen grid) has a 560Ω resistor bridged to pin 6.

Pin 5 (control grid) has a yellow wire to R10 on the circuit board. Pin 6 receives the 560Ω resistor from pin 4 and carries an orange wire to the junction of C10 and R17 on the circuit board. Pin 7's heater connection goes to pins 4 and 5 on V1 and the mains transformer orange wires. Pin 8 (cathode) pink wire goes to the junction of C13 and R15 on the circuit board.

That's it – you've finished the internal construction and connections! Before proceeding, however, double-check all your connections with the instructions and diagrams to make sure you haven't crossed any wires.

FINAL ASSEMBLY

Now, do NOT plug it in yet. Before installing the valves and switching on the Stinger, mount it into the cabinet with bolts. As simple as this is, it can be tricky to for one person to hold the chassis in place and tighten the bolts, so you may find it helpful to borrow a spare pair of hands from a friend to help you hold it in place to complete the job. (Otherwise, it's sometimes easier to place the cab upside-down on a soft towel spread on your workbench or table, rest the chassis in place, and slide each side of the cab slightly over the table edge in turn to tighten down the bolts from underneath – but you'll still have to hold the chassis in place so the speaker magnet doesn't pull it out of position.) Next, connect the speaker cable and plug it into the jack, push the valves gently but firmly into their sockets and re-attach the back panel to cover the internal electronics.

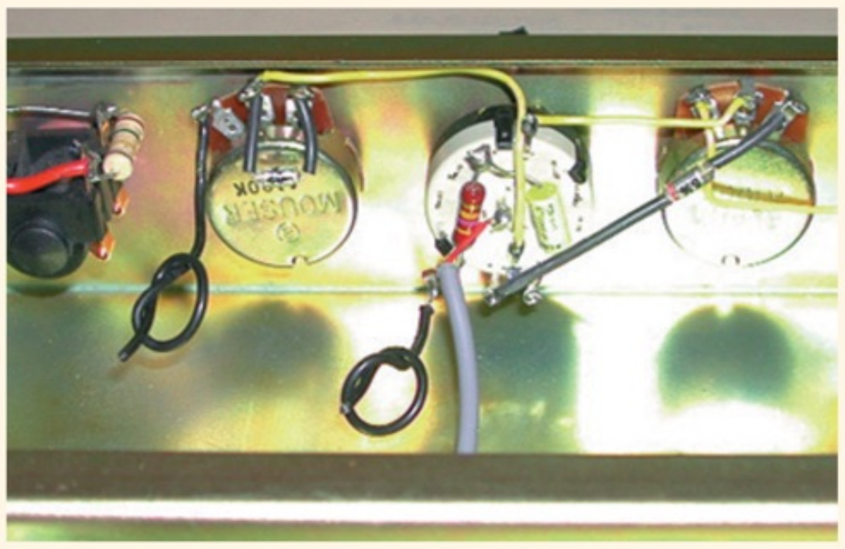
Turn the volume to minimum, make sure the mode switch is turned to Cool, plug in the mains cable, and switch on. The pilot light should illuminate at once, but it will take the output valve up to 30 seconds to warm up. If you hear no loud hiss or oscillation, plug in your guitar and turn the volume up to just under halfway. Let the background hiss flow through the speaker for a few minutes to warm up the voice coil.

OK – you can't wait any longer – so play the thing! But give it a few minutes of rhythmic chord work on Cool first to get the Jensen's cone loosened up, and try to resist blasting Cookin' mode full-out until you've warmed up the C10Q at lesser levels on a variety of settings. But enough instruction: play, enjoy, marvel – after all, you've earned it by building such a fantastic little amp!

IMPORTANT: *As mentioned in Part 1, if the Stinger doesn't work the first time it is switched on, call a professional amp tech rather than trying to rectify the problem yourself. Once the amp has been plugged in and switched on, dangerous voltages have been introduced into the circuit, which will be present even when the Stinger is unplugged thanks to the storage capabilities of the filter capacitors.*

INSIDE SCOOP: The Stinger circuit

Rather than just assembling a kit that appears to work as if by magic, it's fun – and educational – to know what is behind the circuit design, what the components' functions are and why the amp sounds the way it does. The Stinger is the result of a very conscious, considered design effort, so let's take a look under the bonnet with a quick rundown of what the circuit entails, with reference to the diagrams printed over these past few pages.



While the circuit board carries the majority of the caps and resistors, some are mounted on the input, volume pot and mode switch, above

R1 (mounted on the input jack) is the grid leak resistor for V1b and provides the input-matching impedance of the amplifier. This 2.2MΩ resistor has been chosen to provide a high resistance so as not to dampen the output of single-coil or humbucking pickups, or the bullet type microphone for harmonica players (yes, you'll find the Stinger makes a great harmonica amp for blues wailers). R2 and C1 are the cathode bias components and with R3, the anode load resistor, set the gain for the first stage of amplification through V1b. C3 couples the A/C signal at the anode of V1b to the volume control. The volume control acts as a potential divider and adjusts the amount of signal going to the output, which controls the overall volume of the amp.

The capacitor C4 connected across pins 2 and 3 of the volume pot provides a low resistance to the A/C signal, but because the value is very small it's only a low resistance at high frequencies, therefore letting the high frequencies through when the pot is turned down. This is akin to a 'bright cap', similar to the ones brought into the circuit on blackface and silverface Fender amps when the Bright switch is engaged. The value can be changed up from 80p (little effect) to 470p, but any higher will sound muddy and reduce the effect of the control. Different values suit different guitars – 'buckers may need a higher value as they tend to have a lower tonal response to that of single-coils, whereas you might prefer some particularly bright single-coil guitars with no bright cap engaged at all.

The capacitor C5 and R5 across the Cool/Cookin' switch reduces the bass frequencies when the switch is in the Cookin' mode, so the amp doesn't sound too 'woofy' through its 10" speaker.

C6, C8, C9, R7 and R6 form the filter components for the tone controls, pot 2 and pot 3; deviation from these values will change the tonal response of the controls. Minor adjustments to the values can be made. Effectively C6 will change the treble, R7 will change the bass and R6 will change the middle response of the filter (affected by the Bass and Treble controls, even though there is no Mid control in this design).

V1a cathode components C11 and R11 are lifted from earth by R12; this provides an A/C signal feedback path from the output. R13 and C12 set the amount of feedback from the speaker to the output drive valve V1a.

V1a anode resistor R8 and C9 couple the drive valve to the output valve. R14 is the grid leak resistor for the output valve; R10 is in series with the output valve grid and acts as a suppressor preventing high-frequency oscillation.

R12 and C13 are the cathode bias components for the output valve. This type of amplifier design is known as 'single-ended Class A', which means the output transformer is in the anode of the valve and there is a positive voltage on the cathode to achieve the biasing, normally across a cathode resistor.

The 560Ω bias resistor in the cathode limits the current through the valve. This value has been chosen so the amp will produce 8W undistorted output. However, because the amp has high gain, when the Stinger is full-on the total maximum distorted output will be more like 15W.

The power supply to the circuit is achieved by a full wave silicon bridge in the form of four diodes. The large 100uF/450V capacitor and the other de-coupling capacitors have been chosen to produce very low hum and noise levels, so the amp can be used in studios and all low-background-noise-level rooms. Properly built, the Stinger should be surprisingly quiet when switched on, with noticeably less background hiss and hum than other comparable designs – even though those designs are a fair bit lower-powered.

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A 1948 Gibson ES-175 and an early EH-150 amp – with two inputs but no controls

Electronic development

Improvements in the performance of Gibson amplifiers are being made continually by certified engineers in the Gibson laboratory. Complete and modern test equipment includes Oscillators, Voltmeters, Analyzers and Oscilloscopes to thoroughly check amplifier performance. In the photo at the left tests for determining changes in power output are being analyzed.

The Gibson laboratory is staffed with qualified engineers, and functions on a full time basis to analyze, design and develop. Here, a camera attached to the Oscilloscope records the frequency standards for correct placement of the instrument bridge.

It is only through continuing experimentation that improvements and new products are achieved. Gibson's Research Department is one of the most modern in the music industry. Here, in the air conditioned, sound-proof laboratory, the Gibson engineering staff use the latest types of testing equipment for the evaluation and design of better fretted string instruments. Through combined efforts of the Research Division and experienced craftsmen, Gibson maintains its leadership and unsurpassed reputation year after year.

G-3

In Search Of GOLD

Why do many players covet a Gibson guitar but not a Gibson amp? **Michael Stephens** charts the history of a backline that is equal parts fantastic foresight and final failure...

If American guitar makers were a boxing bout, then there would be only be two truly heavyweight contenders – and they would be Gibson and Fender. Gibson packs a weighty punch with six-string classics such as the Les Paul and ES-335 ranges; Fender can slug it back with Stratocasters and Telecasters. Gibson can deliver a massive hit with acoustic shots, from the legendary J-45 to the J-200; Fender has nothing significant in return, and that hurts! But Fender can return the blow with amplifiers, from Champs to Bassmans to Twin Reverbs and beyond. Bam! In reply, Gibson can only offer some amps you've possibly never heard of.

Score draw? Just as it remains remarkable that Fender acoustic guitars are rarely coveted, so it is that Gibson amplifiers are barely spoken of. Yet Gibson were one of the first amp makers... and they began more than 10 years before Fender.

So what prevented Gibson from landing the killer blow when it came to amplifiers? Here's the story of some great Gibson amps that got bruised in the battle of loud.

Early days of Gibson amps

Gibson amps go back to the days of 'the first electric guitar hero', Charlie Christian. Despite any image you may now have of Gibson as 'stuffy' makers, the ES-150 launch of 1935 was pioneering: it included the ES-150 guitar, later dubbed the Charlie Christian, widely recognised as the first commercially successful 'electric Spanish' – plus a cable and an amp. Indeed, in foresight of the starter packs you'll now find exclusive to certain retailers, Gibson developed the pack with two then-prominent US retailers, Montgomery Ward and Spiegel.

Although a straight-out-of-the-box starter pack in concept, the ES-150 bundle was hardly inexpensive. Like many Gibson products – including the ES-335, the J-200 *et al* – the number 150 denoted its price, and $150 in

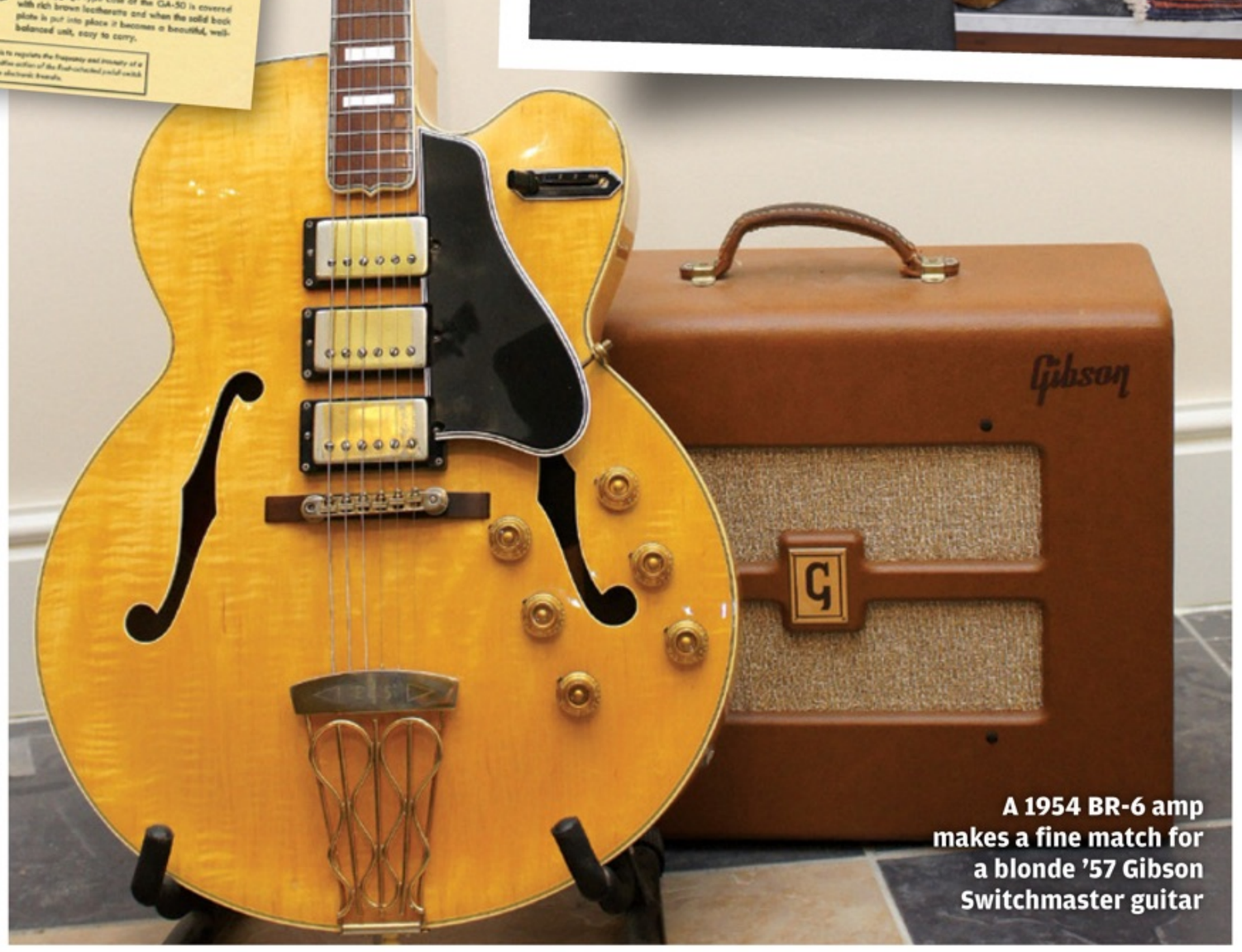
Lap steels and amps: a '50s BR-9 set and a pre-war EH-150 set

1936 is circa $2500 (£1600) today. The Gibson EH-150 amps in the 'starter pack' had square corners (replaced by rounded corners in 1937), two 6N6 power valves (later changed to 6L6s), and a 10" speaker (next, a 12"). It was the simplest thing: no volume control (no, really) plus a 'normal tone'/'bass tone' switch and – perhaps optimistically for a power rating of about 15W – two instrument inputs. Guitarists should have counted themselves lucky: the earliest EH Gibson amps didn't even have a tone switch, and just one valve.

The lack of a volume control was understandable, however, as back then amplifiers did just that and that only – they made early electric guitars louder. All Charlie Christian needed was volume to help his pioneering solos cut through the horns of the Benny Goodman Orchestra. Even so, these early Gibson-branded efforts looked way cool: the EH-100 amps (eight Watts) of the same era had a choice of funky black leatherette or tan 'aeroplane' cloth with vertical stripes, some models boasting yellow stripes. What amp makers will now dub 'boutique retro cool' was, back then, futuristic.

The EH-185 model of 1939-'42 upped the ante – two volume controls, separate treble and bass controls and an external speaker output – and an impressive 15 Watts! To be fair to Gibson, this was cutting-edge stuff, and as pioneers of electric guitars, it made perfect sense for the Kalamazoo company. Without an amp an electric guitar is just a bunch of wood and wire. Gibson knew they had to try and sell the whole package, amp included... and they did try.

That said, Gibson weren't amplification specialists; their expertise was in acoustics, proto-electrics and mandolins. Nashville vintage dealer and noted guitar historian George Gruhn explains, 'Gibson's earliest amps of the 1930s were made for them by Lyon & Healy and were very low-powered compared to the ones introduced by Leo Fender. Fender's amps were far more powerful than anything offered by Gibson then. Even before Fender introduced the Broadcaster guitar in 1950, he made amps that would absolutely kick butt.'



A 1954 BR-6 amp makes a fine match for a blonde '57 Gibson Switchmaster guitar

'Gibson's earliest amps were very low-powered compared to Fender's. Even before 1950, Fender made amps that kicked butt' – George Gruhn

But even before then, something horrible was happening: World War II.

The war of Watts

The USA's involvement in WWII had many meaningful life casualties, of course, but a trickle-down effect was also felt on domestic manufacturing across many businesses. The US Government commandeered a lot of the best woods and valves for the war effort – even Gibson's legendary archtop/flattop acoustics had to use 'less good' wood in the war era – and Gibson put their electric guitar and amplifier manufacture on hold.

Gibson began amp production again in 1946, but they maybe didn't have the in-house skills of rising rival Fender. George Gruhn tells *Guitar & Bass*, 'Leo had a radio repair shop during World War II when new radios were unavailable because all production was diverted for the military. Leo copied circuitry ➔

Photo: www.offsetguitars.com

This 1957 Gibson GA-5 was a match for the LP Junior

Photo: Dave Piggot

A 1958 GA-40: this was the full 'Les Paul' partner amp

'In the '30s, Gibson ruled the roost. You couldn't do better than an EH-150 or 185. They sold boatloads' – Wallace Marx Jr

which had been developed by Western Electric for talking movies.'

Gibson outsourced again: they employed Chicago-based electronic design company Barnes & Reinecke to design a new amplifier line. The new amps included the Ultratone BR-1, BR-3, BR-4, BR-6 and BR-9 models, with 10 to 18 Watts of power. Volume and tone controls were featured on all models, except the smaller BR-6 and BR-9 amplifiers. The BR amplifiers were produced until 1954 but were discontinued to take advantage of more popular features and newer technology – together with a new name.

For Gibson as a guitar maker, a key year was 1952, when the Les Paul Model was introduced. Most players will know, of course, that Paul's exact design input to the Gibson Les Paul is somewhat open to debate, but as one of the first post-war guitar heroes, his name had immense cachet. It made sense to Gibson – given the royalties they paid for Les's endorsement – that some new amps would bear his name too.

Two early coveted classics were the Gibson Junior GA-5 and the GA-40 Les Paul amps. Many of us now think of the Gibson Les Paul guitar as a full-throated, hard-rockin' fat-tone machine, but it's worth remembering that Les

GIBSON AMPS: THE FINAL WORD

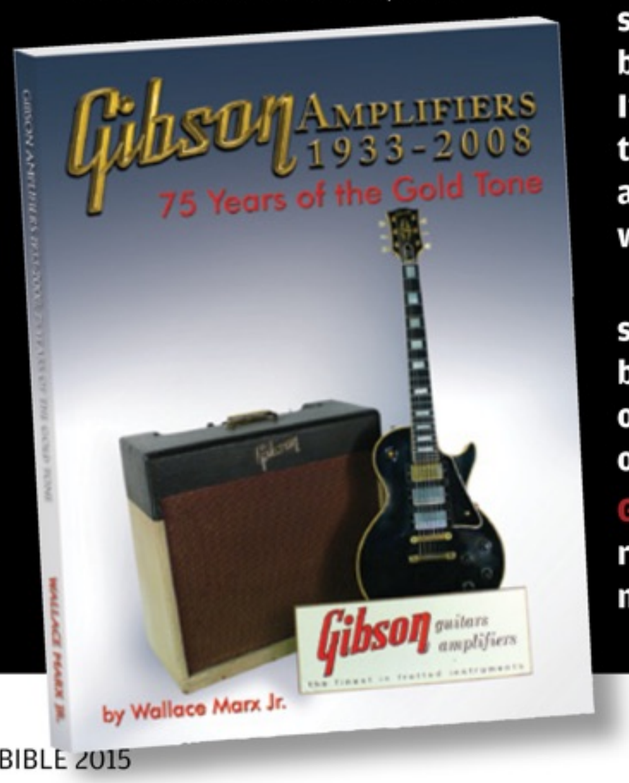
Wallace Marx Jr explains why he wrote his 192-page book *Gibson Amplifiers 1933-2008*

If there's one book you must read for the ultimate story of these amps, it's *Gibson Amplifiers 1933-2008: 75 Years Of The Gold Tone*. Why read this Gibson amp book? Because it's the only one out there! *Guitar & Bass* spoke to passionate Gib-head and author Wallace Marx Jr...

GUITAR & BASS: Did you write your book because you genuinely think Gibson amps are great, or because no-one else had ever done it?

WALLACE MARX JR: Both! In the introduction, I describe the spine-tingling moment when I first heard the greatness of Gibson amps. I was at the Savage Audio shop just outside of Minneapolis – a great place, lots of vintage stuff plus phenomenal new amps. An old amp walked in with a couple of even older guys. Apparently one of them was the original owner of the amp and had been on the verge of putting it in the garbage when his buddy stopped him.

So we all gathered around and saw that it was a late-'50s... Gibson? It looked cool, and we were intrigued. In a few minutes, we had a '50s Les Paul Special hooked up. Someone strapped the axe on, flipped the switch to the bridge pickup, and *brrraaannnggg!* All of us jumped back and hollered. It was one of the best amps any of us had heard. And I'm talking about serious amp guys – repairers, builders, roadies and writers. It was astounding. Literally, this thing had been in the trash heap, and here it was blowing us away with galaxies of tone.



Within moments I turned to someone and asked, 'Is there a book on these things?' Finding out there wasn't one, I was now on a mission.

G&B: Do you think there's a reason why Gibson amps weren't more popular? Was it, for example, that Gibson is perceived as a 'guitar' company while Fender is an 'electronics' company? Or was it because Gibson often outsourced design and build... and players knew that?

WMJ: In the '30s, Gibson ruled the roost. You couldn't do better than an EH-150 or 185. They sold boatloads. Post-war, the market shifted but Gibson was still a big player. Fender definitely came in and ate their lunch.

When you're talking about Gibson vs Fender, it all came down to tone. That's what I've read, and that's what I've heard from guys who were there. Players were a lot less sophisticated in terms of the details around the gear. They didn't know or care what the capacitors were, what the

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GA-90 Amplifier (Inc. Cover)

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An exceptional Gibson First feature of the GA-77 is the monitor jack for headphones for recording, "on the job" monitoring or practice. With the switch at the standby position, a tape recorder can be plugged into this jack, and recordings made free of room echoes and disturbing noises. The GA-77 is sturdy and compact of solid ¾" wood with lock-joint construction in rich two-tone covering of dark brown buffalo grain with contrasting mottled brown and grey; extra large speaker baffle of woven saran fabric; slanted front panel for clearer sound dispersement; jeweled pilot light, protective three amp fuses; special interwound primary and secondary low distortion output transformer; ground included with A.C. line cord. Size: 22" wide, 20" high, 10⅛" deep; weight 40 lbs.

GA-77 Amplifier (Inc. Cover)

This 1955 GA-90 puts out 25W through six eight-inch speakers

Paul's style was what might be called 'light' jazz-pop, and the Junior GA-5 and GA-40 were built to mirror that.

The GA-5 had, indeed, five Watts. The GA-40 wasn't Gibson's most powerful amp of the time, yet its 14-to-16-Watt rating was deemed adequate. But, like the Fender Champ used by Eric Clapton to record *Layla* and the low-watt Supros used by Led Zeppelin's Jimmy Page, the 'meagre' power of these amps didn't mean they couldn't roar when cranked. Indeed, the early GA-5s and tweed Champs were near-identical on the inside, from valves to circuitry design.

Nor was it a case of Gibson 'copying' Fender. The earliest version of Gibson's GA-40 in 1954 had tremolo, a year before Fender's Tremolux. And reverb appeared as a feature on Gibson amps before Fender. The GA-40 remains, says Gruhn's amp expert Keith Gregory, 'one of the most collectible' Gibson combos for vintage valve enthusiasts. Even so, George Gruhn warns us, 'The early Gibson amps simply were not as good as Fenders. They used cheaper speakers, and were lower-powered.'

Not all vintage experts agree that Gibson were necessarily a poor relation, though. Gibson amp aficionado Harry Hank of Hank's Vintage Guitars in Pittsburgh, Pennsylvania, adds: 'A lot of their vintage amps were not held in high regard due to Fender's dominance, but I think this has changed over the last 20 years or so. I own several '50-'60s Gibson amps and they are excellent.

'Many Gibson amps compare quite favourably to Fenders of the same general design characteristics – wattage, speaker configuration, rectification, bias and so on,' Hank continues. 'Many times I have heard comments like "a GA-5 blows a Fender

➔

speaker was, how the thing was built or by whom. That's all a new perspective.

And the difference between Gibson and Fender was about price and prestige. The Sun Studios rockabilly guys played a lot of Gibson because it was the 'gold standard'. They wanted to play the most expensive stuff so they could show off how successful they were.

Gibson was known for its craftsmanship; Fender was the upstart and considered new, weird, and cheap. But when it came to amps, a lot of those guys who went and plunked down hundreds on a Gibson Super 400 with matching amp eventually switched to a Fender Bassman because they were louder and sounded better.

By the '50s and '60s Gibson was making all its amps on-site. By the early '60s they bought new buildings to do it. Seth Lover designed all the amps... not that anybody knew or cared.

G&B: Which are the vintage Gibson amps that shine for you?

WMJ: It's my experience that it comes down to the individual piece. Some are dogs, some are gods. The implication is that any Gibson amp can be phenomenal.

As I mentioned, the EH-150 is a killer. Collectors and players in general seem to have a few favourites such as the tweed GA-30, the two-tone '50s GA-20, and the brown GA-19. The really elaborate ones – GA-83, GA-79, GA-CB – can be fun, but hard to maintain. BR series amps don't seem to draw accolades.

Yes, I do have a particular favourite, but since I'm still trying to buy a few, I'm not telling!

G&B: George Gruhn and Harry Hank both say that Gibson amps were poor from the late-'60s, when the solid-state era began. Do you agree?

WMJ: The very first solid-state amps were kind of nifty. But I think it was all over after 1964.

G&B: Do you have a favourite of the '90s/2000s Goldtones and Super Goldtones? Or was it too little, too late?

WMJ: They were okay. The whole Trace Elliot era did not, in my opinion, produce real classics. A lot of those amps seemed to be over-complex and oddly designed. Build quality was actually decent considering the convoluted manufacturing process. If you're talking about post-Norlin Gibson amps, those orange-coloured rigs that they designed in Los Angeles in the '80s were pretty cool.

Wallace Marx Jr

G&B: With no Gibson amps being built today, is it a shame for fans of the 'gold tone', or was that simply a wise business decision on Gibson's part?

WMJ: Good business decision. There are way too many quality amps being built out there right now for Gibson to compete.

Gibson Amplifiers 1933-2008: 75 Years Of The Gold Tone by Wallace Marx Jr is published by Alfred Music

Photo: Hanks Vintage Guitars

'I think Gibson noted how well Fender was doing and tried to get creative with aesthetics instead of improving tonal quality' – Harry Hank

Champ away" or "the GA-8 Lancer sounds every bit as good as a mid-'50s Fender Tweed Deluxe..." and I have to agree.'

Of the sought-after Gibson GA-40, Dave Hunter – author of *The Guitar Amplifier Handbook* and ex-editor of *Guitar & Bass* – points to the 'unusual' preamp tube used in each of its two channels: a 5879. 'The 5879 has five functional elements rather than the three of the standard 12AX7 dual-triode,' Hunter explains. 'It's sometimes used by newer makers such as Matchless, Dr Z, 65 Amps and others. The 5879 sounds nothing like the familiar 12AX7 – it has a higher gain and a fatter, thicker overall tone. This higher gain doesn't necessarily mean that the tube distorts more easily, but rather that it pushes a firm, bold signal onto the next stage, where you can definitely kick the whole shooting match into distortion if you want to.'

That's some of the science, but in truth, few early rock'n'rollers knew anything about this stuff at the time. They just used their ears, wanted more power, and increasingly had an awareness of 'brand' reputation.

Even in 2015, it remains remarkable how many guitarists you'll see playing Gibson guitars through Fender amps. The other way round? Very rarely... but why so? 'The earliest Fender musical instruments were all lap steels, but much of the company's production was amplifiers,' reasons George Gruhn. 'Many people who played Gibson electric guitars used Fender amplifiers. Amplifiers were a very significant portion of Fender's business, whereas they were never nearly as much, percentage-wise, of Gibson's.

'As important as Leo was in introducing solidbody guitars to the market, his amplifiers were equally important. Without amps powerful enough to drive a solidbody guitar, the Fender Broadcaster or the Gibson Les Paul would not have taken over the market the way they did. It was Fender who introduced amplification loud enough so a four-piece combo could produce more volume than a large orchestra.

'Not only was the sound of a four-piece amplified combo very different from a big band, but club owners were thrilled to be able to pay four people rather than a 30-piece orchestra to entertain their clients.'

Gruhn has a point. A late-'50s Fender Twin had 80W but Gibson amps were rarely ever that powerful. And here's a bit more science in that golden guitar-plus-amp combination: Fender's single-coil pickups had a lower output than Gibson's humbuckers. Plug a humbuckered Gibson into a Fender amp, and overdrive of the amp became easier. Leo Fender hadn't even wanted that, but that was the way rock'n'roll was going: a Fender amp and a Gibson guitar made for a raucous marriage. A Gibson guitar into a Gibson amp? Well, some say you just got even more good tone, but most players seem to have been happy with Fender's more powerful combos.

Gibson amplifiers always did boast great looks. Yet, as Harry Hank notes, 'I think Gibson noted how well Fender was doing

1961 Gibson 'Crestline' series G-8T Discoverer; 15W and a 12" speaker

'By the mid-'60s most all Gibson amps were pretty horrible, but Fender was shining with the classic blackface amps' – Harry Hank

and tried to get creative by changing the aesthetic design... instead of concentrating on improving tonal quality.'

So when it came to rock'n'roll taking over, even by happy accidents, Fender had stolen a march in the amp market. But soon, Gibson decided to throw multiple punches back.

What's in a name?

Fender have always been very smart when it comes to branding. Think Telecaster, Stratocaster, Jaguar (for guitars) and Pro, Twin Reverb, Champ (amps). These names don't explain anything, but such star-spangled wordage has allure. So in the late '50s and early '60s, Gibson got their branding act together for their amp line.

The Gibson Les Paul amps had ceased production in 1961, when Les Paul's contract with Gibson first expired – hence the reworking of the Les Paul guitars as SGs. But new Gibson amps were coming, with the emphasis on bold names as well as the prosaic serial names. You could get the Raider, Invader, Gibsonette, Skylark (a rebranded GA-5/GA-6), Discoverer, Lancer, Rhythm King, and more.

The '50s and '60s also saw the emergence of models called Vanguard, Hawk, Scout, Titan, Mercury, Atlas, Apollo (a mighty 90W 2x12"), Ranger, Saturn, Explorer and Minuteman. From 1959 to 1961, Gibson even built the stereo GA-80T Vari-Tone, designed solely for partnering the ES-355 guitar with its Vari-Tone switch. Wow. Was that possibly too many amps for a company known better for its excellence in guitar-making?

Despite these myriad models, Gibson never became a huge seller of amps. According to the documentation on Gibson amplifier sales – and they were never as careful about chronicling amp production as much as their guitars – the biggest seller in a single year was still the GA-5 in 1959, with 5303 units shipped. But Gibson amps had their fans. Elvis Presley's guitarist Scotty Moore got a Gibson GA-77RVT Vanguard (launched in 1962) in 1965 and used it for decades (RVT means reverb plus tremolo). When Dylan and his band 'went electric' at the 1965 Newport Folk Festival, Tele-totin' Michael Bloomfield plugged into a Gibson Crestline combo – a rare but famous example of a Fender guitar played through a Gibson amp.

The late 1960s changed everything... for a while. Solid-state was the new way forward, apparently, and Fender, Vox USA and Gibson all travelled down the transistor road. As a consequence, all-valve amps such as the UK's Marshall, Hiwatt and Orange ascended to the throne of beefy tone. Fender survived, but Gibson amplifiers slowly slipped off the sonic map. Harry Hank reckons: 'By the mid-'60s most all Gibson amps were pretty horrible, and Fender was shining with the classic blackface amps.'

Tube exit

It didn't help that the Gibson company would change ownership and direction. The GSS100 (Gibson Solid State) amp was a 'flagship', but despite significant marketing these were seen as a poor replacement for the older valve models. In the late 1970s – when Norlin Corp owned Gibson – they entered a partnership with Moog. A new breed of solid-state amps, the Lab series, was co-designed by Robert Moog's team; but despite endorsements from BB King and major advertising, the Gibson Lab ➔

A 1999 Gibson GA15RV, essentially a rebadged Trace Elliot Velocette 12R

amps flopped. Of course, they were ugly... but then again, few '70s amps were beauties.

When Gibson returned to 'proper' valve amps in the '90s and 2000s, the models did gain plaudits and this time they looked great. In the late '90s Gibson acquired UK manufacturer Trace Elliot, and rebranded the company's Velocette guitar amplifiers as Gibson Goldtones. The fact that the Velocette's styling already borrowed heavily from original '50s Gibson amps must surely have been a factor in the purchase.

Until 2002 examples of Gibson Goldtone amps (brown leatherette finish) were actually made in the UK, though the later ones (black Tolex) were US-built. The Super Goldtone models boasted a more fully spec'd design – courtesy of Trace Elliott's British principal amp design engineer Paul Stevens who had been retained by Gibson – and these amps garnered much acclaim.

Gibson now even got a stellar endorser onboard in Aerosmith's Joe Perry. However, given that Perry owns 400-plus guitars (by then including his own signature Les Paul), you can guarantee that Goldtones were not JP's only go-to combos. It was maybe too little, too late to regain a foothold in the amp market – even for a company as renowned as Gibson.

The perception problem

Gibson have always built – or at least 'branded' – fine amps. Some are so-so, some are superb. Yet Gibson amps were never widely popular; for a mirror image, look at Fender's acoustic guitars. Here's a thought: Gibson's guitar division is a 'stringed instrument' company, if you like. Fender is known as an 'electronic instrument' company. (Both corporations now own multiple brands across all music equipment, of course.)

Maybe that original perception of the two companies endured. The greatest Gibson guitars are hard to beat for tonewoods and craftsmanship; Fender's guitars remain more 'utilitarian' and are of an easier-to-build design. And don't forget Leo Fender was

The GA30RV Super Goldtone followed Gibson's mixed-speaker tradition with one 12" and a 10"

GIBSON AMPLIFIERS

GIBSONETTE AMPLIFIER

Outstanding features and attractive design distinguish the Gibsonette amplifier in the lower price field.

The leatherette covered luggage case is made for easy transportation and is accented by a decorative perforated metal grill. Features of the Gibsonette include: 4 tubes, 8 watts output; 10" speaker; 2 input jacks; volume control. Only 15 pounds in weight, the Gibsonette is 17½" wide, 13" high and 7" deep.

Gibsonette Amplifier
8C Cover for Above Amplifier

GA-30 AMPLIFIER

A new member of the Gibson amplifier family is the beautifully styled GA-30 model, encased in dark brown leatherette, and designed to give the player a large choice of unusual performance effects.

Twin Jensen 12" and 8" speakers offer true fidelity of tone in both high and low registers; full 14 watt output allows an extra wide range of volume and tone colors; 6 tubes are used in the special tone control circuit of the GA-30, which has 4 input jacks and separate tone and volume controls.

New bass Tone Expander control allows the player to increase resonance and quality of the lower notes, advantageous in instrumental solo work.

GA-30 Amplifier
30C Cover for Above Amplifier

GA-75 AMPLIFIER

An outstanding amplifier, the GA-75 offers unusual tone response and performance. For ease of operation and adjustment of controls, the chassis is mounted at the top of the case.

The GA-75 has 7 tubes, 15" speaker capable of 25 watt output, an acoustically treated speaker baffle, specially designed dual-tone control circuit with separate controls for bass and treble tone, control panel is removable for easy servicing. A special feature of the GA-75 is the 5 input jacks . . . . 4 instruments and 1 microphone, each jack independent of the others with no interaction between instruments. This amplifier has proven ideal for accordion and string bass amplification.

The luggage-type case is covered with brown leatherette; size—24" wide, 20" high and 9½" deep; weight—28 pounds.

GA-75 Amplifier (Inc. Cover)

a radio electronics engineer – he always had a head start when it came to amplification.

Neither of the two US guitar titans was likely to win this bout on all counts. Both brands' electrics are formidable. Want a great acoustic? Of the two heavyweight makers, you'll covet a Gibson. Want an amp? You'll go to Fender.

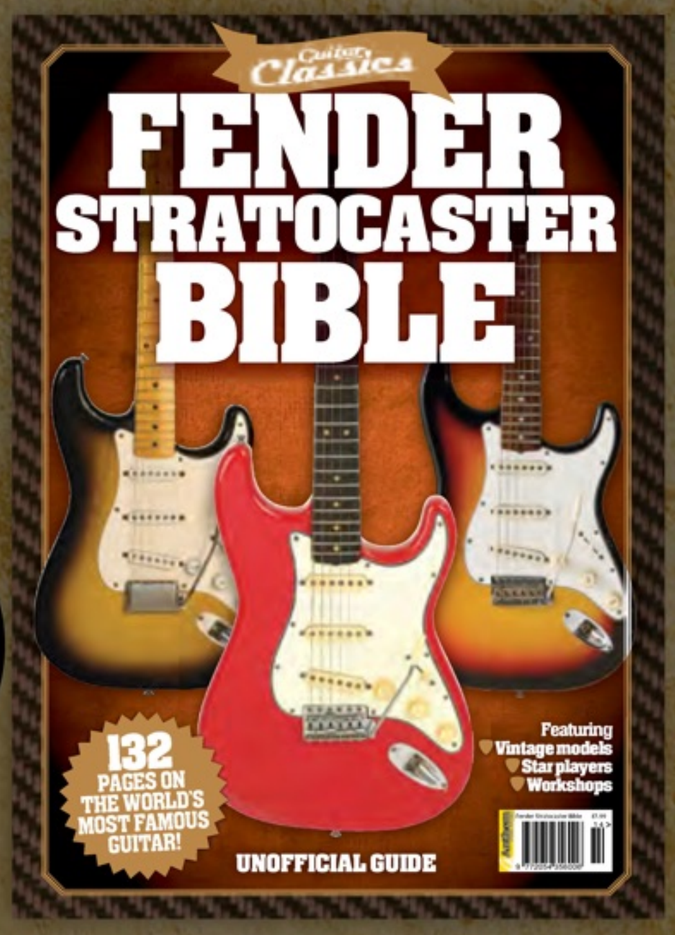
So there's no final knockout, but Gibson clearly lost to Fender on amps. 'Although they did produce amplifiers long before Fender, Gibson's [original] amps were designed for a clean, perhaps dark sound for use with their "jazz" guitars,' Harry Hank concludes. 'Fender amps were brighter-sounding and suitable for use with most any electric instruments.

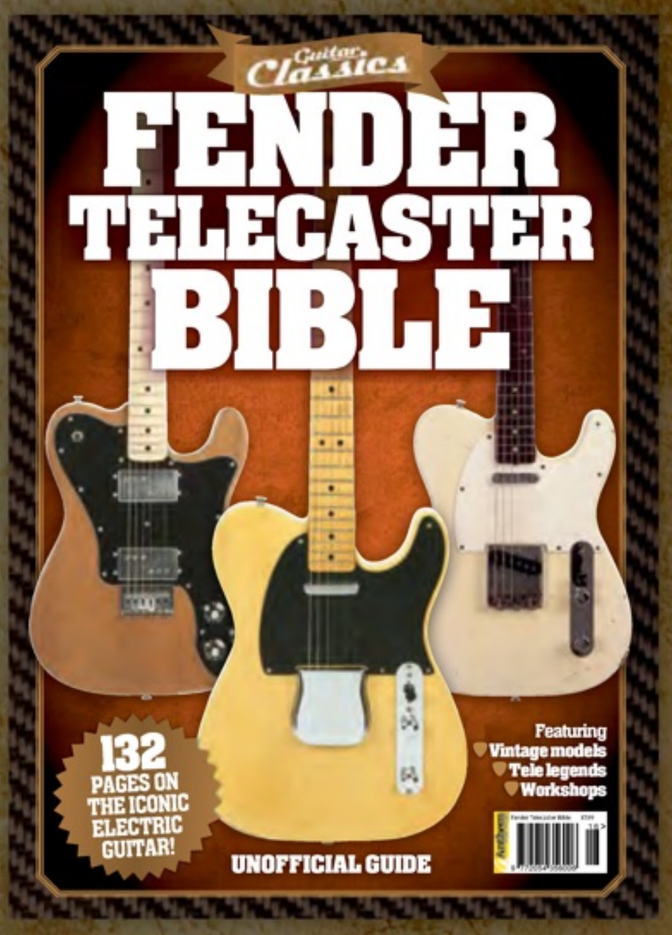
'Also, Gibson never marketed their amps so well, since guitars were the main focus. Credit goes to Fender's marketing efforts – most notably Don Randall – and also the endorsement of many of the recording stars of the time who used Fender products. Fender amps were affordable, sounded good and were mass-produced, which put a lot of them on the market. I don't think Gibson realised the potential for amp sales the way Fender did.'

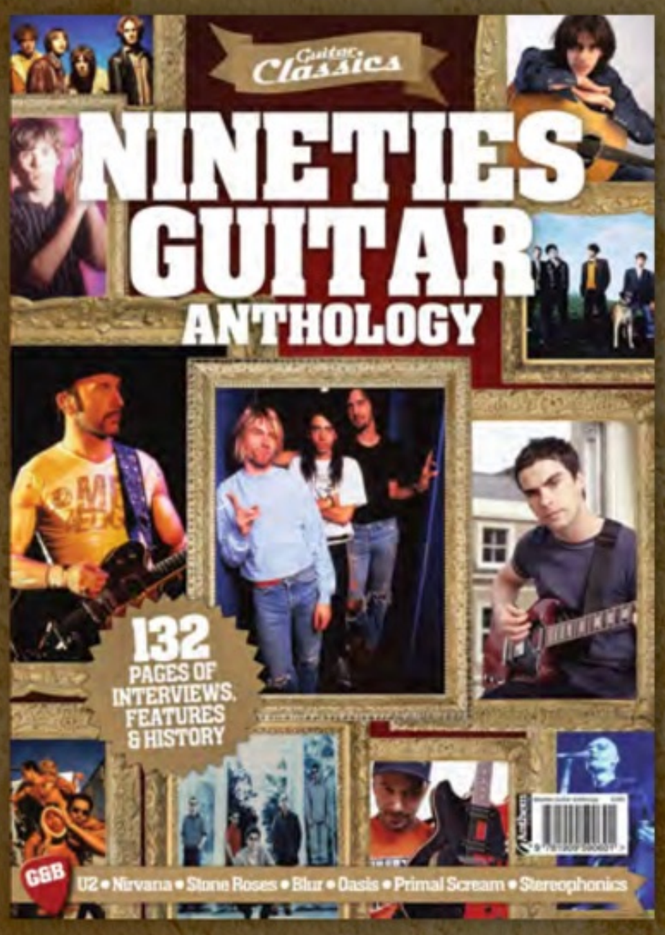
In 2015, Gibson Brands are still producing superb electric and acoustic guitars, great basses and top-end mandolins. They also own DJ, speaker, piano, drum brands and more. And today's Gibson amps? Here endeth the tale, for 80 years after helping to pioneer them, Gibson does not make guitar amplifiers any more.

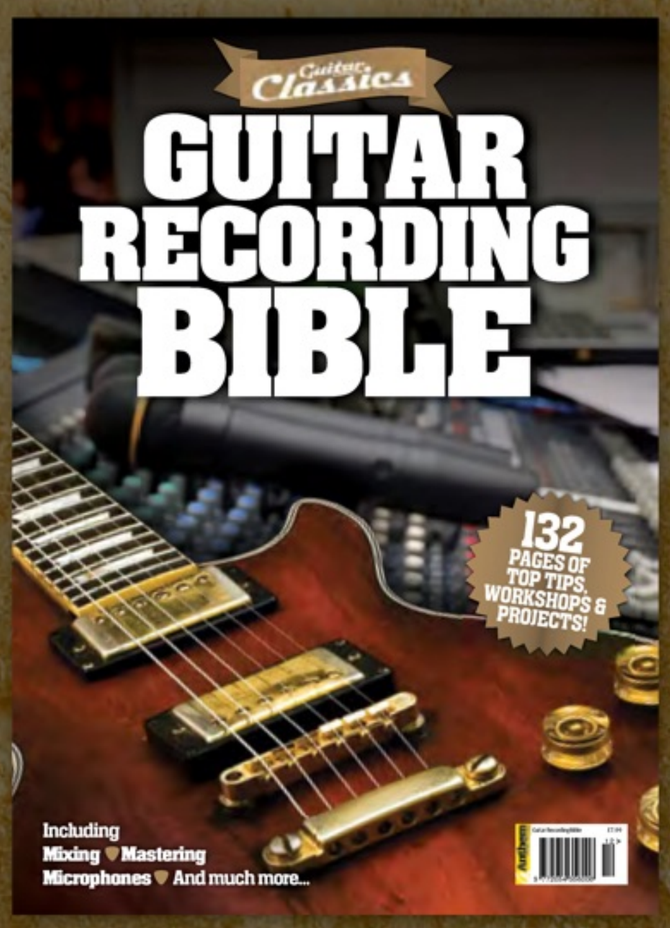
Thanks for their expertise: George Gruhn (guitars.com) and Harry Hank (hanksvintageguitars.com)

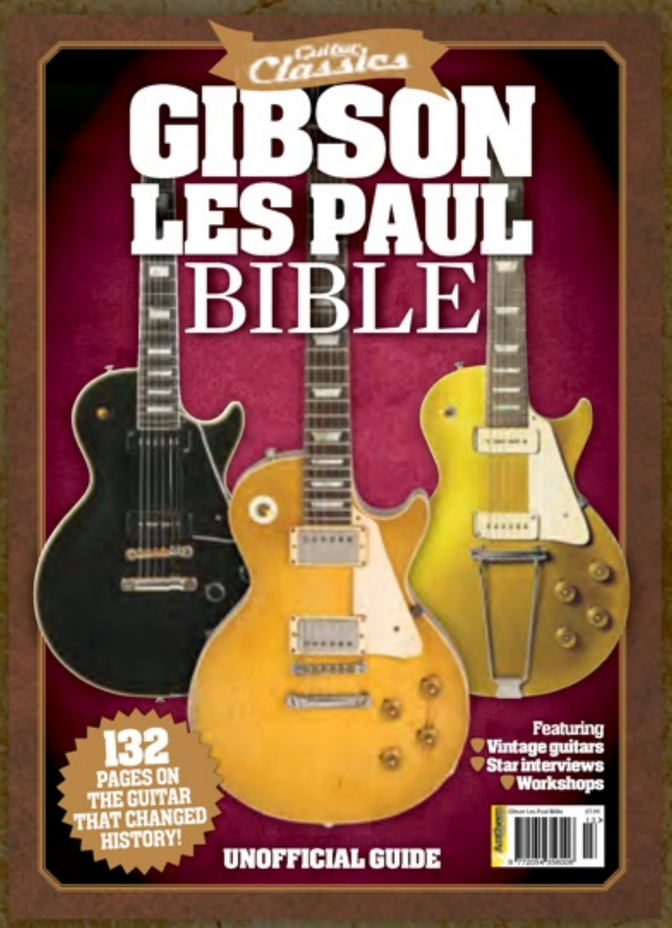
COMPLETE YOUR CLASSICS COLLECTION











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LEAD
RHYTHM

TONE KING
Sky King

If you love Tone King amps but can't decide which one to buy, the Sky King does the lot – with extra output stage control, state-of-the-art power-scaling and a fine reverb and tremolo too. Review by **Huw Price**

FACTFILE

TONE KING SKY KING

DESCRIPTION **Twin-channel 35W valve combo with 1x12" Celestion G12M65 Creamback speaker, spring reverb, tremolo and Ironman attenuator. Made in the USA**
PRICE **£2449**

CONTROLS **Ch1: Volume, Tone, Mid-Bite. Ch2: Volume, Treble, Bass, Reverb, Intensity & Speed (both channels), Pentode/ Ultralinear switch, channel switch, 4/8-Ohm impedance switch, individual channel attenuator switches**
COLOURS **Black, brown or cream**

CONTACT **Coda Music**
01438 350815
01582 725625
www.toneking.com

Tone King's first amp, the Imperial, was designed to deliver the raw tones and spongy feel of '50s and early '60s Fenders, while lower-powered tweeds and Supro amps inspired the later Falcon model. With an unconventional ultralinear output stage, cathode biasing and zero negative feedback, the Falcon's overdrive tone was designed to be sweeter, smoother and more rounded; thanks to its Pentode/Ultralinear switch, the Sky King promises to do both.

With a pair of 6L6 power valves producing 35W, the Sky King is also the more powerful amp, and any concerns that we wouldn't be able to drive it hard enough were dispelled by the built-in power attenuation. Tone King makes a standalone attenuator called the Ironman – a transformer device that presents a resistor-less reactive load – and the Sky King has a built-in Ironman attenuator with independent controls for both channels.

A mammoth 5U4G tube rectifies the power, with four 12AX7s and a 12AT7 handling preamplification, tremolo and reverb duties. The open-back pine cabinet houses a single 12" Celestion G12M65 Creamback speaker and the control panel is conveniently located at the front. The circuitry is handwired and the overall finish and build quality corresponds with our expectations of a premium American amplifier.

A huge 5U4G tube rectifies the power; there are two 6L6GC output valves

The reverb isn't switchable, but the channels and the tremolo are

Sounds

Rhythm is the designated clean channel, and with the attenuator switched out it's easy to discern the effect of the Pentode/Ultralinear switch. In pentode mode the tone sparkles and chimes, with the scooped mids and big lows we'd associate with medium-power blackface amps. Ultralinear lowers the output level while softening the treble and adding girth to the midrange. The volume control is labelled from 1 to 9, and pentode mode stays clean up to number 5 or 6 – depending on whether you're using single-coils or humbuckers. Although clear and bright, the clean tone is touch-sensitive and devoid of spikiness. Above 6 the overdrive increases exponentially, with the midrange filling out and becoming more compressed. At full tilt the Sky King is fairly loud, but notching the attenuator by one increment brings things

Like this? Try this...

Carr
Slant V6
Another handwired US amp with a strong blackface Fender influence. Power is 40W but it can be switched to fixed bias (22W) and cathode bias (18W). The V6 has spring reverb, and Channel 2 is voiced for heavy overdrive
RRP **£2899**

Fender
Vibro-King 20th Anniversary
A 60W combo with three Jensen P10R speakers, Pre-Gain, '63-style reverb, dwell with Mix, Tone and Fat switch, vibrato, effects loop and retro brown tolex
RRP **£2899**

Lazy J
40
The looks are tweedy but this two-channel 40W combo comes with optional valve-driven reverb and bias tremolo modules, a sensitivity control and tweed/blackface switching.
RRP **£2099 (with reverb and tremolo)**

With the exception of Ch1's Mid-Bite knob, the Sky King controls are blackface-simple

Pentode mode covers tweed, blackface and Marshall sounds, while Ultralinear opens up another world of voicings

down to a comfortable pub gig level with no diminution of sound quality.

The Ultralinear setting provides a much chewier and looser playing experience. In this regard it's tweed-like, but the tone is smoother and lacks the raw edge of a true tweed. This is no bad thing, and it's a superb basic tone that you can control with your guitar volume and shape with pedals.

The Lead channel certainly doesn't concern itself with pseudo-clean tones. Some overdrive is present even with the volume control set low, and it builds gradually from there. The tweedy rawness that was absent from the Rhythm channel can be found here in spades... so whether you prefer your overdrive biting and crunchy or buttery smooth, this has it covered.

The versatility comes from the interaction of the Mid-Bite and the Tone. For such a simple set of controls to be effective, an amp must have a pretty fine sound to start with. We think the Treble and Bass are voiced just right, and the two tone shapers simply emphasise and de-emphasise various shades of the core sound.

The Mid-Bite takes the midrange from scooped to full, and with Volume and Tone set high, the sound takes on a more contemporary rock edge. The in-between settings run the gamut of vintage-style voicings, from upper midrange bite to bluesy and boxy mid-heavy grind. Even at full volume the Sky King holds together really well, and the tonal characteristics of all our test guitars cut through.

Unlike some supposed 'lead' channels, this one genuinely provides enough gain and sustain to play solos without the need for stompbox overdrive or compression. Again Pentode mode is snappier and edgier, but Ultralinear has the softer and saggier lows that so many players enjoy from vintage amps. You can even combine tweedy bass with a Vox-like midrange, and we had a lot of fun dialling in early Led Zeppelin tones with a Tele and a Les Paul.

Reverb and tremolo work on both channels, and a dual footswitch is provided for trem and channel switching. The reverb is deep and three-dimensional with a very useable level control. Although the tremolo doesn't pulsate as quickly as some, it sounds strong and with the reverb it's a perfect match for retro fun.

Speaker is a single 12" Celestion G12M65 Creamback

Pentode/Ultralinear switch and Iron Man attenuator live around the back

Verdict

The Sky King is almost like a collection of fantastic classic amps loaded into a single cabinet, and it's remarkable how such versatility can be achieved with such simple controls. Pentode mode covers everything from '50s Fender to early Marshall via the blackface era, while Ultralinear opens up another world of dynamic response and tone voicings. When you factor in a spring reverb that can be subtle or cavernously intense, a tremolo that you can feel inside your chest and an award-winning attenuator that would cost around £650 as a standalone unit, the Tone King Sky King easily justifies its boutique status - and price tag.

FINAL SCORE

TONE KING SKY KING	
Build quality	**19**/20
Versatility	**19**/20
Sound	**19**/20
Value for money	**17**/20
Vibe	**18**/20
TOTAL	**92%**

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The Wonderful WORLD OF AMPS

G&B columnist **Sid Bishop**, aka the Bishop of Denmark Street, gives his own perspective on the fast-changing world of amplifiers...

While I was spending all those entertaining years working in guitar shops I noticed, time and again, that my customers would sacrifice a great amount of time selecting the guitar of their dreams, gladly spending virtually every penny they could gather together, then finally, almost as an afterthought, buy an amplifier to plug it into – and this particular item usually as cheaply as possible. When I started out I was guilty of the same thing, so I'm in no position to pass judgement. An amplifier was an essential purchase, you couldn't manage to do very much without one, but most viewed it as nothing more than a black box whose sole purpose was to make their prized new guitar audible. We couldn't have been more wrong.

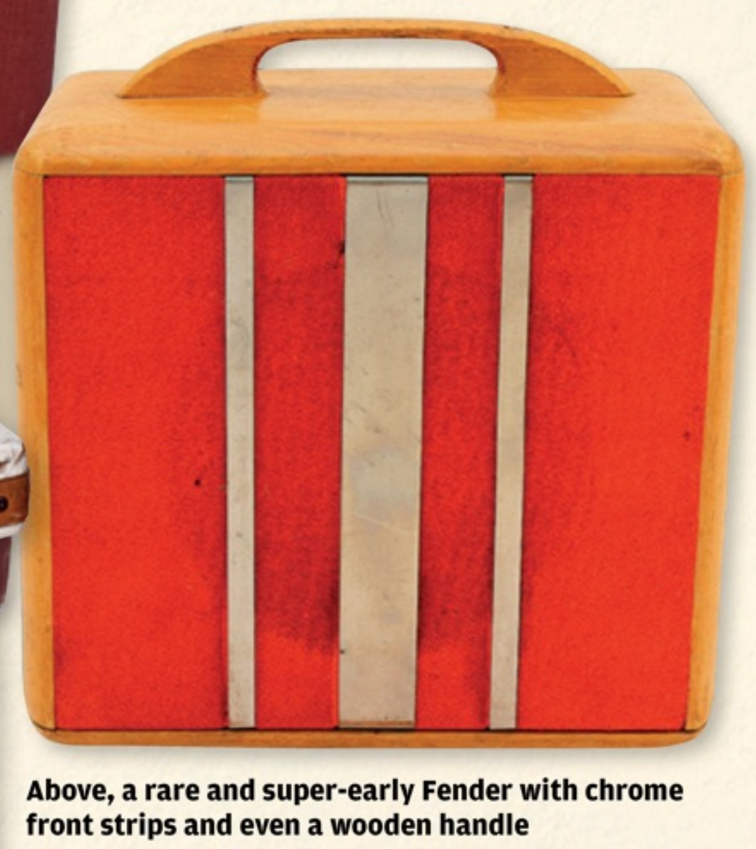
After many years of playing and countless hours listening to others, I now realise just how crucial the choice of an amplifier is. A relatively cheap guitar played through a good quality amp will usually sound pretty good, whereas an expensive top-of-the-range guitar played through a crappy amp will sound, well, like crap. The amplifier gives your guitar its voice. It's a vitally important piece of kit, and there is some logic to the view that in reality greater care, not to mention financial investment, should be expended on your choice of amp than on your choice of guitar.

We've all become more educated about amps in recent years and are now more aware of what they actually do, what their capabilities are, and how our eventual choice of equipment has a bearing on the sounds we produce. We also now have a wealth of competing products to choose from.

Over time, we've formed firmly held opinions on amplifiers. Some players prefer valve amps, some solid-state, some might even favour a hybrid, and all have quite logical reasons for doing so. Many players are captivated by the romantic appeal of a genuine vintage amplifier, while yet more have been swayed by the new generation of modelling amps. We tend to buy whatever is most suitable for our needs at the time.

Gretsch Electromatic Deluxe, made by Valco

Left, a handsome late-'50s TV12 combo from Selmer, the pioneer of British amp manufacturing



Above, a rare and super-early Fender with chrome front strips and even a wooden handle

Today's guitarists are fortunate that there are a large number of amp manufacturers around today – this hasn't always been the case. Most of the major guitar makers produce a range of amps to complement their guitars, or at least have done in years past, and in addition the current market seems to be saturated by small boutique makers who offer us really beautifully crafted pieces of equipment... at a price, of course. One of my brief internet surfs has just uncovered around 30 such makers. There are other marques that, for a variety of reasons, are now consigned to history, and examples turn up sporadically on the vintage market, usually at very high prices too, such is the current obsession for all things retro.

Back when the electric guitar was first invented in the mid-'30s a purchaser's choice of amp will have been very limited, essential though it was. Makers such as Gibson, Epiphone, Gretsch and Rickenbacker all produced complementary amplifiers, though appearing primitive to our modern eyes, and often looking like little more than picnic cases with a speaker mounted inside them. Generally kicking out all of five or six Watts, they were nonetheless the state of the art at the time, and seemed adequate for the jazz and country bands of the day. Very few survive from this period, and those that do are really museum pieces. And further development in amps, or guitars come to that, had to be put on hold during the inconvenient interruption that was the Second World War.

Upon the advent of rock'n'roll in the 1950s, and the massive surge in the popularity of the electric guitar that went hand-in-glove with that genre, it soon became obvious that something more was required. More power became essential as the decade progressed, and 10W amps gave way to 20W amps, which in turn were superseded by 50-Watters, and so the 'arms race' continued. Not for the first time Fender led the way, and even by 1952 had already introduced the awesome Twin amp. This generated 65W in its original form, but by 1958 had been redesigned to deliver a truly gigantic 85W. Fender have made many varieties of the amp in the years since, including solid-state versions, and still produce a Twin to this day – though not the original type with the attractive, though ultimately impractical, varnished tweed

covering. Needless to say original fully working examples of these, and indeed all other 'tweed' Fender amps, currently fetch very serious money. As I'm sure you know, none of these beauties were available to us here in the UK at the time due to the post-war embargo on US-made goods which was not finally lifted until 1959. Any that you might see here now have been bought over in later years by enthusiasts, dealers and collectors.

We British buyers would be forced to choose from a very limited range which might at best have included a Selmer, a Dallas, a Fenton-Weill or an early Vox or Watkins (later to become WEM). These were all small and limited in performance... but it was all we had, so we just got on with it. Happily, all this was about to change. Really useable amps, such as the Vox AC30 and the Selmer Thunderbird Twin Fifty, appeared by the end of the '50s, and now we guitarists could finally start to seriously deafen people (and ourselves).

The evolution of amplifiers continued unabated into the '60s, and not merely in terms of their Wattage. By the end of the decade we had the awesome Ampeg SVTs, those wonderful Acoustic 260s and 360s, Fender Dual Showmans, Sunn Coliseums (the best big amp ever), and probably most memorably of all the Marshall stack, the go-to amp if you were really serious about blowing the pub windows out. They also became more efficient tonally, and other effects such as distortion, reverb and tremolo (or vibrato) became common. Manufacturing processes improved immensely, incorporated better quality control and component standards, and entire factories sprang up to produce nothing but guitar amplifiers, so they were better-made and more reliable.

There was, however, an Achilles heel, and it existed within what was basically a piece of electrical equipment constructed from designs carried over from the world of '30s radio technology – the valves that all these amps were using. Valves would shake loose, rattle and cause poor connections, they had a tendency to shatter if you happened to knock the amp over or drop it, and worst of all they would burn out, requiring replacement – frequently in as little time as a year.

At some point someone thought it would be a really cool idea if a guitar amp could be made using the brand-new space-age technology of transistors. The very first transistor radios appeared as far back as 1953, and their benefits became quickly evident. They were lighter, the circuitry itself took up a lot less space, and they were far more reliable.

Left, the Burns Orbit range led the way for solid-state amps in the UK

Classics from Marshall, Watkins and Fender

It wouldn't be too long before somebody somewhere applied the same technology and all of those advantages to other electronic appliances, including guitar amplifiers. All of the aforementioned valve-related problems would be eradicated at a stroke, and you'd have a piece of equipment that was smaller, lighter to carry to gigs, and offered total reliability. What could possibly go wrong?

There are several competing companies who claim to have 'invented' the transistor, or solid-state, dedicated guitar amplifier. Both Standel and Kay present convincing cases, and there are examples from both that are reported to date from around 1962. A small Gibson amp was to follow in 1963, and for once it was a British company that made their mark in the same year as the Burns Orbit 40 and 60 arrived on the market.

I owned an Orbit 60, purchased from Selmer's at around that time, so I must have had one of the very first examples. It was a good amp, actually. It was reliable and looked great, but my ever-increasing appetite for volume eventually forced me into using it in tandem with an AC30. On one unlucky night on the way to a gig it flipped over in the back of the van, and never worked again.

A canny endorsee program helped Vox become one of the most visible brands of the '60s

Most other makers jumped on this bandwagon. The first WEM and Vox tranny amps appeared in 1964, Vox's most noted examples being the T60, Super Beatle and Royal Guardsman, and by the following year we were all but overwhelmed by an avalanche of transistor amps from Selmer, Dallas and Baldwin, with companies like Gibson still expanding their existing ranges.

Then 1966 saw the first 'slant-front' tranny amps from Fender; these were truly dreadful, being poorly made, sounding even worse, and I've been reliably informed that large quantities of unsold amplifiers were simply left out in the factory car park to rot away in the California sun. It was a marketing disaster for Fender, and it would be many years before they tried again.

So that's the early years... more to come over the page in Part 2!

With a transistor amplifier you'd have a piece of equipment that was smaller than a valve amp, lighter to carry to gigs, and offering total reliability

The Wonderful WORLD OF AMPS PART 2

In his second helping of vintage wisdom, **Sid Bishop** eases into the ’70s and beyond to see how much amplification has changed

During the ’60s, new companies entered the amp market. Some continued to use valves, others went down the solid-state route, and some did both. Newcomers by the end of the decade included Orange, Impact, Kelly, Traynor, Kustom, Burman, Carlsbro, Sound City and Vamp, among others. The chief designer/engineer for Sound City was an industry legend named Dave Reeves, who eventually severed his ties with this company and began making his own range of amps, Hiwatt, from around 1970 or 1971. Dave is no longer with us but his amps are, though now made by a different company.

The Japanese were getting in on the act, and first-generation Rolands and Yamahas were turning up in shops all over the country, while the Guyatone brand was already fairly familiar to many UK musicians. Makers from continental Europe ought not to be overlooked, and we should tip our hats to Davoli, Echolette and Binson, although their dated designs could never hope to compete with the leading British and American names.

Orange and Hiwatt set new standards for volume and tone and were used by The Who, Pink Floyd and others

Sound City amps were first built in the back of a West End music shop, designed by Dave Reeves with the help of Denis Cornell

Triumph – a company who made electronic medical and diagnostic equipment, and had their office next door to the old Orchid ballroom in Purley, Surrey – was a brand I had a personal involvement with. For some bizarre reason they decided to branch out into amplification, and made those little Leo-branded practice amps. In 1967 I was playing in the Deviants and we had (deviously) obtained a Triumph endorsement deal. They gave us a vanload of their gear, all 100W transistor heads, 4x12" cabinets, in both guitar and bass versions, and a complete PA. I don’t think they’d set the world on fire these days, but at the time they were quite something, having built-in fuzz, reverb and a fully illuminated control panel. We gigged these for two or more years, and we never had a failure; they were light, reliable and very, very loud. Despite all of that, and the assistance of the Deviants, they’d disappeared from the market by 1970 or so. So had the band.

The ’70s saw this vibrant market expand still more, and other makers such as H&H, Polytone and Maine entered the fray. 1973 also witnessed the first solid-state slimline Marshall amps. To say they were not a great success would be a bit of an understatement, and sales were poor. They were dropped from the catalogue fairly promptly and it wasn’t until recent years that the Bletchley giants introduced a range of more efficient and reliable solid-state amps.

Below, the ill-fated Triumph brand, as hammered by Sid himself, and the famous tuck-and-roll Kustoms

A dominant brand during the ’70s and beyond was Peavey. Hartley Peavey had been a keen amp repairer who began working from his own garage as long ago as 1965, and he ultimately went into full production with his own line. He made valve amplifiers at first,

Line 6, now a big name in amplification, launched in 1996

We've reached a point where there's an amp out there for everybody, but you might have to work through a few to find the right one

following traditional formats, but in time realised the advantages of transistors. He was one of the first makers to come up with the concept of a 'hybrid' – an efficient solid-state input stage with a warm-sounding valve output stage. Peavey's amps were first imported into the UK by us at Top Gear. In time they became the market leaders, thanks to a comprehensive range of solid-state and valve amps, from small practice and studio models right up to full backline.

By the end of the '70s and into the '80s Marshall had gone back to valves, Orange went into hibernation for 10 years or so, Selmer, Kelly, Maine and Sound City had vanished from the marketplace, H&H had gone bust and been bought out by Carlsbro, Epiphone, Gibson and Guild had ceased producing amps altogether (aside from the Lab Series made by Gibson's Norlin parent company, borrowing some clever Moog circuitry), Rickenbacker were producing only small studio and practice amps, and we were witnessing the final setting of the Sunn, erm, sun, culminating in their purchase by Fender in the mid-'80s. Yet the '70s and '80s saw considerable advances in the production of hybrid amps. Some – Peavey, Musicman, Mesa/Boogie – used the SS preamp format with a valve power stage, but others did things the other way around, thus negating the necessity of a heavy power transformer. The now-discontinued Fender Performer series is a good example, and there are several others.

By the '90s the invention of the microprocessor made yet more significant advances possible. We began to see amps with dozens of built-in effects, some even giving us the ability to reproduce the tone of a wealth of legendary classics, and the press of a button would enable us to instantly obtain the sound of a JTM45, a blackface Twin, a tweed Fender Concert and dozens more.

I have owned two modelling amps in recent years. The first, which I will not name, was one of the earliest and really not very good, sounding 'clangy' and being confusing and cumbersome to operate. The second was a Behringer Vintage 60 equipped with a Jensen 12" speaker. This turned out to be a really good amp tonally and volume-wise. Accessing effects was easier, though I had to constantly remember the location of the one I required, and with 99 to choose from I had to write the numbers down on a sheet of paper. I sold the amp and went back to using a low-tech Fender 85 and stompboxes.

I've recently seen amplifiers with not just built-in effects and infinite amounts of pre-set classic amp tones, but also with programmable drum machines and even basslines. I'm guessing the idea is that you can pre-programme an entire set then do the gig solo; just a little guitar playing and some singing would be required. From an audience standpoint I think this would be a very dull gig to watch, and from the performer's point of view you'd just need to press one wrong button and you'd be stuffed. It all makes me wonder what the future might hold...

We've now reached a point where there's an amp out there for everybody, but you might have to work through a few to find the right one. If you're fixated on the warmth and tone of valves then there's bound to be one for you; and the younger generation, totally at ease with all the latest computer-based technology, can find something suitable too. There are many hundreds more between those two extremes.

The explosion in the production capabilities of the Chinese over the past few years means that good-quality band equipment is available to us all at moderate prices... though if you are of the opinion that a handmade boutique example that costs the same as a small flat in Croydon is for you, and you've convinced yourself that it's worth the investment, well, it's your money!

Peavey amps, stage mainstays from the 1970s onwards

Top, an affordable Behringer modelling amp; below, the king of kleen, a tranny Roland Jazz Chorus 120

These days you can edit sounds from your phone, yet the high-end valve amp market is still strong

Acoustic PREAMP

THERE'S NO ESCAPING THE ACOUSTIC REVOLUTION, but for many guitarists that means investing another wodge of cash in a whole new sound rig – unless you let amp guru Kevin O'Connor instruct you in building a simple preamp to inject your acoustic instrument into a 'standard' guitar amp...

The 1990s saw the beginning of a trend for 'unplugged' concerts where whole bands dispense with their amps and electric guitars and just play acoustic instruments. Commonly you would expect to see a microphone in front of each instrument, but some of these instruments are less unplugged than others. Those that do not use mics are often plugged into a new class of guitar amplifier called an acoustic amp – the ultimate sonic oxymoron.

This project helps you get around the 'acoustic amp' fad for just a few pounds' worth of parts and a couple of hours of planning and labour. It's a simple design that even beginners should be able to approach – as long as you've got a good lower-wattage soldering iron, a pair of wire snips, a drill and a few other basic tools. We'll take you through the basics here and leave it up to you to determine the precise layout, along with the format for mounting or enclosing your preamp.

ON THE MIC

A microphone and PA do a good job of capturing the tonal qualities of an acoustic instrument as it's heard through the air. The evenness of the sound depends on the mic technique of the player, akin to the vocal technique of singers: proximity to the mic determines loudness and bassiness. The distance should be constant except where the player wants to get intimate (play quieter and move closer), or get raucous (play louder and move away from the mic to avoid overloading the board). Experience is the best teacher, and true working musicians achieve great skill at this technique by virtue of playing very often. Still, this can be a difficult thing to do while trying to remember what to play and sing.

Installing a microphone or some other kind of transducer into the instrument lets the player plug into the board directly, or into an amp on stage, eliminating all those mic-proximity issues. But what kind? Dynamic mics are low-impedance devices just like guitar pickups, and they need a lot of gain to achieve a line-level signal. Condenser mics require a built-in preamp and impedance converter, which then demands a battery or phantom power supply, but this type of mic more accurately captures the sound of the instrument. Either of these can be plugged into a conventional guitar amp without tonal penalties, but noise may be an issue.

Many players prefer to use the same amp for electric and acoustic, and this produces a lower-fidelity acoustic sound that is more listenable than the very hi-fi acoustic amps. It also saves a lot of money!

IN THE BUFFER

Another form of condenser mic is the contact pickup, sometimes called a piezo. This is a variable-capacitance device that responds to pressure changes across its body. A piezo strip is often mounted under the bridge, where the varying string pressure creates a piezo-electric current in the pickup. This current is tiny and requires a very high-impedance preamp input for the full frequency range to be captured.

Plugging this transducer directly into the standard guitar input of 1MΩ will result in a thin, trebly sound. The same result occurs if a volume control is strapped directly across the pickup in the guitar without a proper buffer between them; this buffer is what we are about to build.

Fortunately, there is a device with a very high input impedance that we can use to properly load the piezo – and it's also inexpensive, small and plentiful: the 'jfet', or junction field effect transistor. There are many circuits that will achieve extremely high input impedance, but this is about the simplest one possible. It works well and can be constructed many different ways.

CIRCUIT TRAINING

A standby switch is used to make sure the amplifier is quiet and lower the power dissipation inside it when you won't need it for some time. You're using this switch to tell your amp: 'Be completely quiet for a while, but stay ready to go into action instantly when I tell you.' Breaks between gig sets are an obvious example. If you'll be coming back to the amp within an hour or so, flip it to standby. The amp will not make any sound when it's not wanted, and will cool off a bit, but still be ready to play with the flip of a switch.

We understand standby better these days than we used to. The idea was inherited from the mainstream electronics industry back when it also used valves, but it has some issues. We now understand that the 'cathode stripping' damage to tubes we thought we were avoiding with standby does not happen at the voltages used in most valve amplifiers; the 'soft warmup' process that was thought to be a reason for using standby may also not

Connections

The electrical components, switches and jacks used in this project – as well as a range of metal project boxes – should all be available from your local Maplin shop, or from their website: www.maplin.co.uk. The majority of these parts might also be available from other general electronics and hobby stockists.

ELECTRONIC COMPONENTS

(Diagrams 1 & 2)

- R1 – 10MΩ to 33MΩ 1/4W resistor (5% tolerance)
- R2 – 1kΩ to 10kΩ 1/4W resistor (5% tolerance)
- C1 & 2 – 22u/25V radial electrolytic capacitors
- D1 – any diode such as IN4000, IN4148 or IN914
- Q1 – any n-channel jfet
- 9V – standard 9V battery

OTHER PARTS

- Perforated project board
- 9V battery clip
- stereo jack (plus a second mono jack for input if preamp is box-mounted)
- metal project box – optional
- hookup wire

be so soft. Some tube amps – notably the Vox AC30 and a few Marshalls – have problems with standby. Rapid, repeated standby use can actually damage the tube rectifiers in some amplifiers.

BUILDING THE PREAMP

In this circuit (Diagram 1), any jfet can be used as long as you know the pin-out and 'sex' of the device – p-channel or n-channel, the latter being more popular and generally cheaper. Just two resistors, two capacitors, one diode and the jfet are required, and none of the values are critical. R1 should be the highest value you can find: anything from 10MΩ upwards will do. This is the input resistor and is the load for the pickup. R2 may need some adjustment for your own particular application, but will likely fall between 1kΩ and 10kΩ. This biases the jfet, and should be increased in value if distortion occurs.

C1 is the output capacitor, which has two functions. First, it blocks the DC voltage at the source of the jfet from getting to the output; second, it couples the signal from the jfet to the outside world. You may place a volume pot after the cap or go directly into an amp. C2 is just a power supply filter cap. The diode (D1) is there to protect C2 from a reversed battery connection (the jfet itself can withstand this) and can be any type that can take 9V. The battery is any standard type that 'sounds' good to you. Be careful to orientate C1, C2 and D1 correctly as these are polarity-sensitive components.

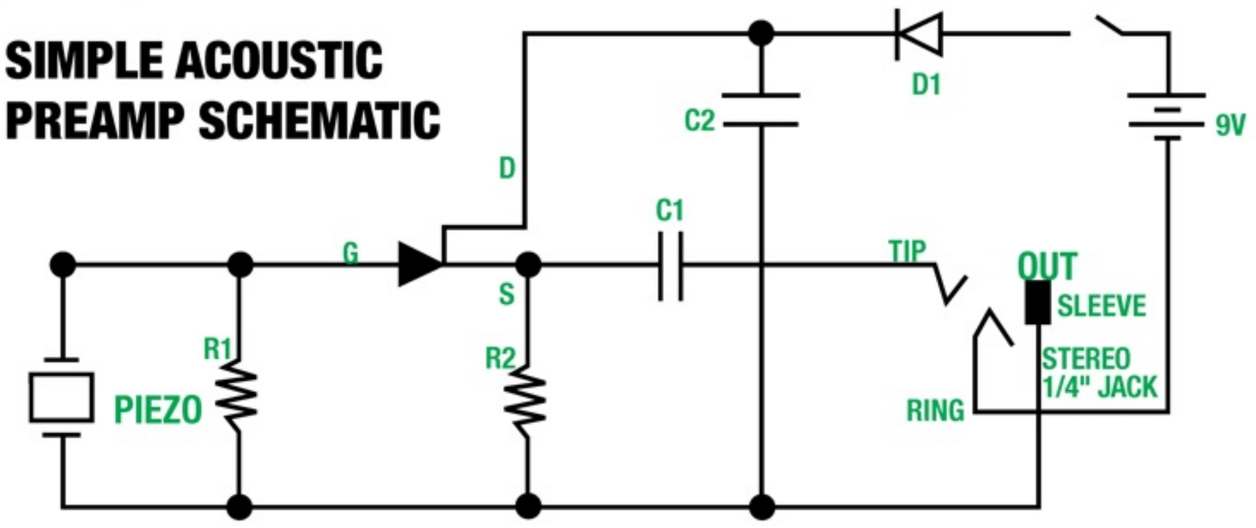
A small piece of perforated project board is the best way to assemble this preamp. Both sides of the board are shown in Diagram 2. To house the unit and its battery, a small metal enclosure is recommended. Steel provides both magnet and electrostatic shielding, while aluminum provides only electrostatic shielding (though it's easier to work). The unit can be mounted in an acoustic guitar or bass, preferably where easy battery access is possible through the sound hole [al*though G&B doesn't recommend fitting this internally yourself unless you're highly experienced at such work; otherwise, take it to a pro*]. For other instruments, or just for versatility, you may choose to build the unit in a diecast aluminum box like a pedal (in which case a second, mono jack is required as an input). Then you can use the same preamp with any acoustic instrument you play that does not have a built-in preamp or volume control.

It's a simple project – but take your time, plan out the full design before you begin, and solder carefully to make tidy yet solid connections on the board. Good luck... and *viva la acoustic revolution!*

Kevin O'Connor is one of Canada's most respected boutique amp builders and designers. A more complete discussion of acoustic preamps can be found in his books Tonnes Of Tone and The Ultimate Tone Vol. 2. Both are available from Power Press, ***www.londonpower.com***

Diagram 1

SIMPLE ACOUSTIC PREAMP SCHEMATIC



R1 - 10M-33M 1/4W 5%
R2 - 1K-10K 1/4W 5%
C1, C2 - 22U 25V RADIAL ELECTROLYTIC
D1 - ANY DIODE 1N4000, 1N914
Q1 - ANY N-CHANNEL JFET
9V - STANDARD 9V BATTERY

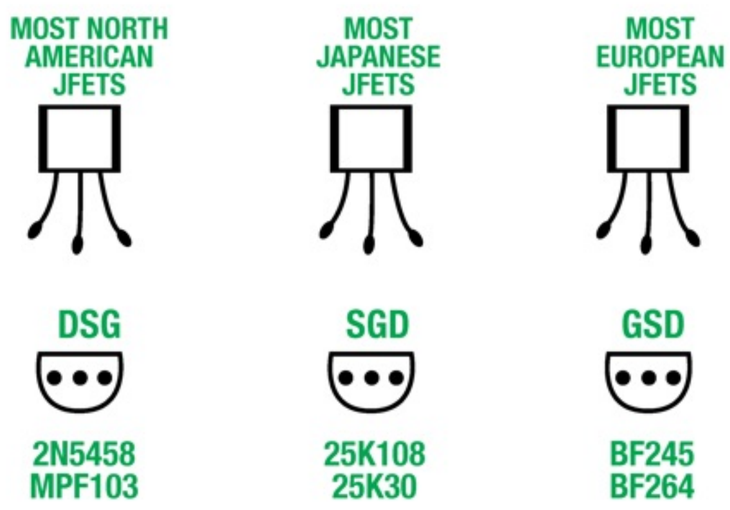
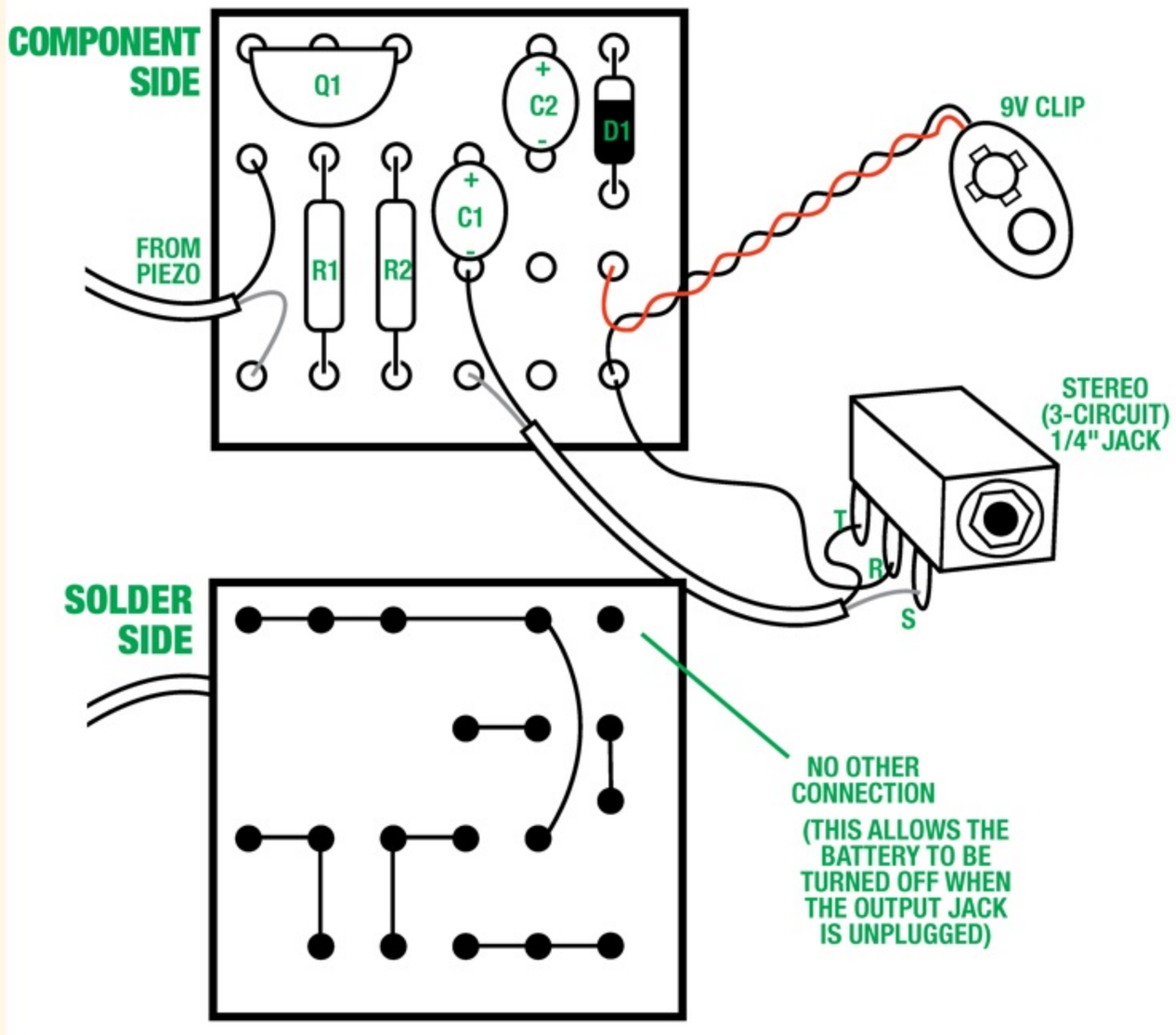


Diagram 2

PERF-BOARD CONSTRUCTION AND WIRING (THE BOARD IS LAYERED OUT FOR BF-SERIES JFETS)



ORANGE

TINY TERROR

POWER OUTPUT

VOLUME

TONE

GAIN

GUITAR

OFF

STBY

ON

15 WATTS

7 WATTS

INPUT

ORANGE

VOICE OF THE WORLD

ORANGE

ORANGE

Tiny Terror Amp & Cab

Back in June 2007, we got our first look at the little Orange powerhouse that would spark a lunchbox amp revolution... this was **David Petersen**'s verdict

Metal cases used to be the format of choice for industrial and PA equipment. They were never popular for stage amps – tough, certainly, but they soon looked as if they'd been dragged down the road, not carried. Knowing this, Orange has provided its Tiny Terror with a smart gigbag to protect against the obvious dangers of life on the road. Why give themselves the trouble? Well, the advantage of this method of construction over the traditional covered wooden case hasn't lost its appeal – anything that can be pressed, folded and printed wins hands-down on cost, once the tooling's done. Also, today's shift towards home and studio means road knocks are much less of a daily risk. The Tiny Terror is squarely aimed at this sort of use.

We're suckers for this kind of novelty, but it has to be practical. The casing is tough and smart (so far, anyway), with the usual jaunty Orange graphics in a nicely produced acrylic finish. The padded shoulder bag looks to be up to its job, and includes a useful zip-pocket for cables and other accessories. This arrangement offers some protection to the control knobs (they're usually recessed in a conventional amp head), but they need to be considered when the amp isn't in its bag.

The cab is a solid piece of kit, but it's big for the amp and the speaker may be too highly rated

Pushing the Gain knob brings the amp into its element – recording-friendly crunchy overdrive

Electrically, the Tiny Terror's class A push-pull design, contrasting with one or two competitors in this area by not being single-ended, gives a solid 15W of output. This is a bit too solid for some uses, and its power selector switch offers a 7W option, by tapping the transformer to give about 80V less on the supply. The hardware is good – metal toggle switches, a jewel pilot lamp and businesslike control knobs support an overall impression of durable fitness. Inside, a single printed circuit ties

FACTFILE

ORANGE TINY TERROR

DESCRIPTION **15W all-valve head with 7W output option; 2 x EL84, 2 x 12AX7**
PRICE **Amp £365, cab £199**

FRONT PANEL **Single jack input; Gain, Tone, Volume controls; 7W/15W output selector; Off/Standby/On**

REAR PANEL **IEC socket/ fuse assembly; HT fuse; 16 Ohm output jack; paired 8 Ohm output jacks**

CAB **1x12" with 16 Ohm Celestion G12K-100; paired input jacks**

DIMENSIONS **Amp: 30cm wide, 14cm high, 13cm deep. Cab: 55cm wide, 45cm high, 20cm deep**

WEIGHT **Amp 6kg, cab 14kg**

ACCESSORIES **All cables and padded gigbag for amp included in price**

CONTACT **Orange Amplification 020 8905 2828 www.orangeamps.com**

Like this? Try this...

Marshall
1974X combo
UK build and handwiring command a price, but a shootout between the Marshall and the Orange wouldn't be a one-sided contest by any means
RRP **£999**

Vox
AC15CC1X combo
Fab all-rounder, but it could take some hits from the Orange in the crunch zone. Dangerously close in price due to similar origin of manufacture – this contest will likely be decided by the 'cool' factor
RRP **£485**

everything neatly together in what's by now the conventional way. The assembly isn't pressed for space and the transformers are generously dimensioned despite the amp's compact overall size.

The 1x12" cab is a mini-me version of Orange's traditional 2x12"s and 4x12"s. It's not unwieldy, certainly a one-hand carry, but compared to the head's ultra-compact look it seems big for its job. In a non-mobile context this won't be a problem – the spare margins around the amp are ideal for drinks, ashtrays (if allowed) and so on – but those tempted by the amp's shoulder bag into braving public transport should consider the possibilities carefully. Perhaps a lower-powered cab with a 10" speaker and smaller dimensions could be a useful option here, particularly as the Celestion G12K-100 fitted to this one is working at less than half of its saturation limit with the amp flat out.

Sounds

Power-up is uneventful, although it's good practice to leave the switch in its Standby position for a while. The noise-floor is unobtrusive, in fact stony silent until you plug in and unmute the preamp. Then, although it gets audible with Gain and Volume well advanced, it's always low compared to the sound output. Halfway settings on all three controls with the amp set at 15W give a useful clean sound level with a Strat, and start to transit into semi-dirty tones with a Les Paul. To get clean with humbuckers you could pull back on the Gain, but backing off the guitar gives an equal result with a slight crunch to hand if wanted.

The tonality is dominated by mid and high-mid colouration with both guitars, with an agreeably musical woodiness always present. With the Strat, this slightly nasal quality benefits the neck pickup but sounds a bit emphatic with the other two. The tone control can be used to good effect here, but much of the Tiny Terror's character is created by this tonality and it's a shame to suppress it. The top volume level is unexpectedly giggable, although that's not this amp's primary function.

There will be more than one opinion on the clean sound, but probably a high level of agreement on the drive sound. Pushing the Gain (not more than 8/10) brings the amp into its element: recording-friendly crunchy overdrive. The middy clean tone fills out into a beautiful balance of low mids and smooth highs, and the reediness sometimes found with EL84 output stages is only produced at extreme Gain settings (to avoid it when metal tones are wanted in the studio, it may be worth checking out one or two of the many pedals dedicated to the task). The Strat sings nicely on any pickup selection, and the Les Paul does a convincing fuzz-via-stuck-wah that can be tuned to taste on the guitar's tone and volume controls. If there's any issue here, it's the Tiny Terror's dominance of the overall sound, which makes these two guitars sound a bit similar. But that could be said of many high-end overdrive amps, which puts the Tiny Terror in good company.

The low-power option is, thankfully, fairly gentle in its overall effect; many such arrangements throw too much water on the fire. Here instead there's a small change in level with a bit more dirt. It's a useful thing to have, because pushing EL84s' hard-to-get output-driven crunch can result in failures, particularly with cheap unmatched valves, and the lower supply voltage in 7W mode protects them from their self-harming tendencies without much sound penalty. A good idea, therefore, to use this as standard unless you really need big sound levels – the Tiny Terror might surprise you with what it can do in that area, too.

Lastly, the 1x12" cab is solidly made from 18mm ply, nicely finished, and up to anything the amp can throw at it. For us, there's a bonus in the tone department when the speaker's driven towards its saturation limit, which is usually around half of its rated power limit – the compression effect then causes the guitar and amp to interact. The 100W unit in this cab never gets near this, and the amp isn't fully represented by it, although it's decent enough and, of course, bombproof in this context. There's a smaller cab somewhere in the Orange range and it might be worth asking about comparing the two before committing to one or the other. As in all these matters, let your ears decide.

The Tiny Terror's class A push-pull design gives a solid 15W of output, with an option to switch down to 7W

The metal case is easier to manufacture than a wooden one... plus it looks cool

Verdict

There are plenty of 15W valve amps out there, and many of them challenge the Tiny Terror in the area of clean sound. But the Orange excels in the crunch zone, where its range of sounds is wide, easily controlled, and musically satisfying. The format is novel, with a high cute factor, but this is also a fine-sounding and well-made unit that should be taken seriously as a recording and small-gig amp.

FINAL SCORE

ORANGE TINY TERROR	
Build Quality	**16**/20
Versatility	**12**/20
Sound	**16**/20
Value for money	**18**/20
Vibe	**18**/20
TOTAL	**80%**

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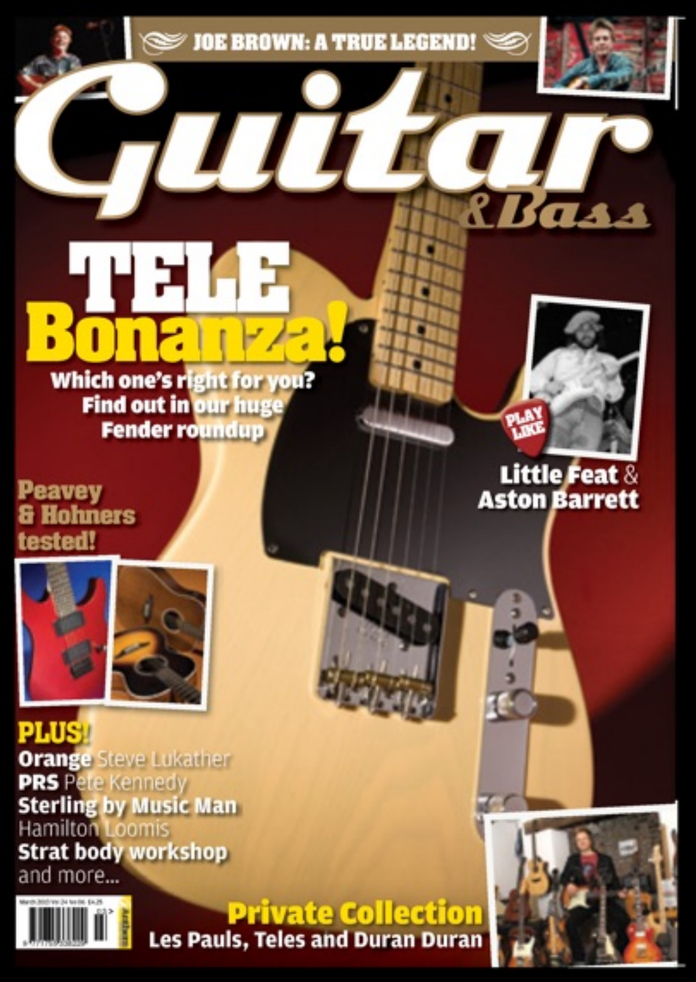
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Left, a '51 Supro Supreme; above, catalogue pages from 1954 and 1959

Supro AMPS

Cheap, cheerful and ever-changing, Supros were the affordable alternatives to the big-name amps of the '50s and '60s... and had a raucous sound all their own. **Michael Heatley** has the story

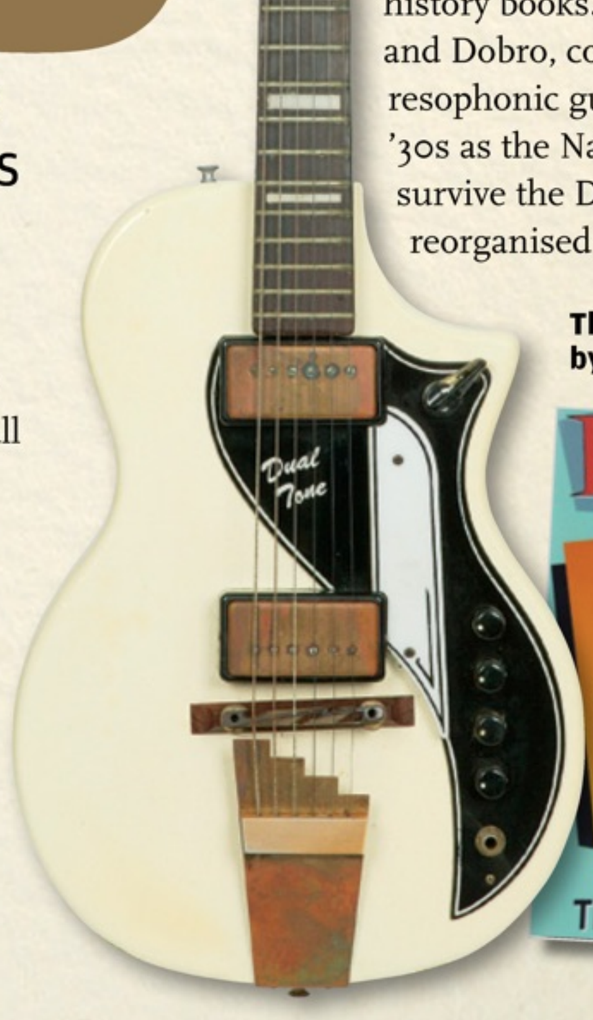
The grand old name of Supro has recently returned to the spotlight with a series of amplifiers based on some old favourites of the past. The Supro story clearly has pages yet to be written – but, with due respect to current endorsees like Steve Stevens, Richard Fortus, David Hidalgo and Rick Vito, they will have to form an orderly queue behind such names as Jimi Hendrix and Jimmy Page as the highest-profile fans of the brand.

This wasn't a story led by a Leo Fender or Jim Marshall pushing back the frontiers of sound. Supro, despite its distinctive lightning-underlined logo, was content to be outshone, selling on price and value rather than imitation. And no matter how often hopeful dealers draw parallels to similarly configured Fenders, Supros were limited-output valve amps that tended to misbehave if pushed to their limits.

Paradoxically, that drawback would prove their saving grace when they appeared on vintage amp enthusiasts' radar, and a personality finally emerged in the Supro story when the aforementioned James Patrick Page adopted the brand – coincidentally, in the very year they went out of business. The overdriven valve sound was in vogue, and cheap was most definitely cheerful.

Supro was a product of the Valco company. The Chicago-based manufacturer – formed by business partners Vic Smith, Al Frost and Louis Dopyera and taking the initials of their first names as its moniker – would make and market guitars and amps under various names through to the late '60s.

The Valco company's history is highly confusing, and several equally plausible versions are available on the web and history books. Suffice to say that National and Dobro, competing manufacturers of resophonic guitars, came together in the '30s as the National-Dobro Company to survive the Depression. In 1942, they reorganised once more as Valco; Supro



The Dual-Tone has been used by Link Wray, Zappa and Bowie

was their house brand. Valco started manufacturing Hawaiian guitars and amplifiers under its own name and as a subcontractor for Oahu, Harmony, Airline, Kay, National and Gretsch.

The guitars

The post-war guitar boom saw Valco make instruments in many shapes and sizes. As respected writer Tom Wheeler put it, 'If you wanted to step up from your bargain-basement Harmony and couldn't afford an Epiphone... then Valco was the place to go.' Supro remained resolutely price-conscious, their marketing deliberately un-trendy. 'Don't let the moderate price fool you,' they warned on the cover of the 1960 guitar and amp catalogue. 'Supro products perform with excellence and many are unequalled in their price class.'

Few guitar designs found big-name favour at that stage, though there is a Link Wray album cover (*Rumble! The Best Of*) that shows him holding a Supro Dual-Tone, introduced around 1957 with a price tag of $149.50. Valco also dabbled in fibreglass-bodied guitars in the early '60s, but had reverted to wood-bodied models by the time they closed for business. Supro guitars have been popularised in recent years by the likes of Jack White and the Black Keys' Dan Auerbach. Jimi Hendrix's first guitar was a Supro Ozark (see over the page for more detail), but his apparent use of Supro amps while serving his apprenticeship on the chitlin' circuit with the Isley Bothers, Little Richard and others is harder to substantiate.

Valco made amps for Gretsch with all the Western trimmings

Supro specialised in combos and these often looked as good as they sounded, with vinyl to match the finish of many of their guitars

The amplifiers

Many up-and-coming players must have used Supro amps in their budget-conscious early days yet, with fame still far in the future, photographic evidence is hard to come by. What we do know is that Supro specialised in combos, and these often looked as good as they sounded, with vinyl to match the finish on many of their guitars.

The Supro amp range and reputation grew during the '50s, and peaked in the '60s as six-string sales boomed post the Beatles' 1963 *Ed Sullivan Show* appearance. By the late '60s the parent Valco company had become the third-largest amplifier manufacturer in the United States. Most Supros that still exist are '60s products – not only because more were produced but also, being a decade more recent, they stand a greater chance of still being around and in playable/repairable condition.

There was a model for every player and price point. The top of the line in the 1954 catalogue was the 12W to 14W 1665T Golden Holiday with its twin speakers, three inputs and an optional footswitch to engage its tremolo. List price was $130, just about double that of the 4.5-Watt, single-speaker Super 1606.

Towards the bottom of the comprehensive price list could be found the leatherette-covered, 8"-speaker Model 1614 Spectator, retrospectively compared by some to the Fender Princeton, at just $75. The catalogue blurb –'reliable amplification at moderate volume' – was hardly likely to bring out the rebel in any self-respecting teenager, though the electric guitar itself was still in its infancy. 1954 was, after all, the year the Strat first made its appearance. ➔

Left, the $75 Model 1614 Spectator amp; above, catalogue pages from 1954

Photo: Gil Reynolds courtesy of www.reverb.com

Photo: Experience Hendrix

FAMOUS SUPRO USERS

Jimi Hendrix

The names of Hendrix and Supro have been linked ever since it was discovered that a Supro Ozark was the first six-stringer Jimi ever owned. Howlin' Wolf has been pictured playing one, but it's not known if this played a part in the choice.

Hendrix experimented with various amplification systems over his short, meteoric career. Apart from a combo, believed to be a Silvertone, bought for him in late 1962 by a Nashville club owner, he mainly borrowed amps for gigs, and there is little photographic evidence of exactly what he used.

He has retrospectively been associated with the Supro Thunderbolt, issued in 1964 and initially marketed as a bass combo. It's claimed he played one while touring with acts like Little Richard and the Isley Brothers early in his career, and that claim now resides on hundreds of internet blogs. It has also been said that he used a Thunderbolt to record his first hit, *Hey Joe*, but it is inconceivable he would have transported the amp across the Atlantic.

We can surmise that, since Hendrix performed with his amp settings more or less on full, he would have been among the first to discover and utilise Supro's warm overdriven tones. Indeed, it's said that when he toured as an opening act for the Impressions, Curtis Mayfield plugged in and found his (presumably non-Supro) speaker had been blown by the over-enthusiastic young man.

Hendrix moved on from Supro to the Fender Twin, using one from 1965 to 1966, just before his discovery by Chas Chandler and subsequent flight to Europe and fame.

Albert Lee

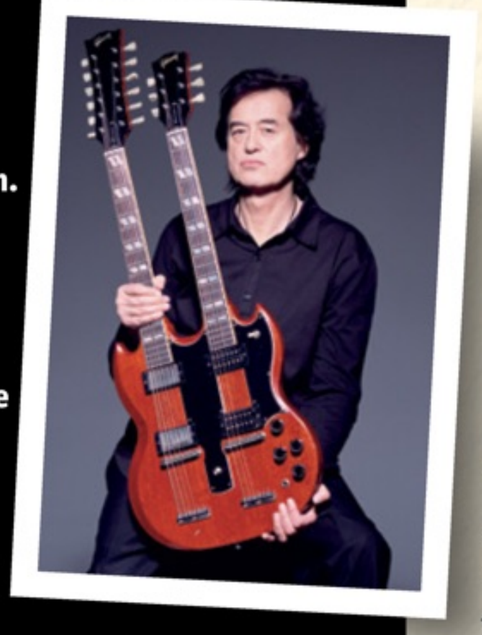
The home-grown country guitar legend, still performing today at 71, was one of the first Supro owners in the United Kingdom, and is the man who originally turned Jimmy Page on to the brand. But as with the Zepmeister, there's a certain amount of confusion and mystery.

His Supro ('I honestly don't know the model and probably never did,' he's confessed) was purchased from the Selmer amp shop on London's Charing Cross Road. He recalls it was equipped with a 15" Jensen, which suggests it was a Thunderbolt. If the Supro was bought in 1961, however, then the Thunderbolt can be ruled out as the iconic bass amp wasn't issued until 1964.

Albert owned a Les Paul Custom, and an impressed Page bought a similar guitar and combo set-up. Lee, with regret, 'really can't remember what model amp Page bought.' Albert doesn't believe Selmer sold Supros for long, and when another guitarist borrowed his and blew the speaker, he found it impossible to source a Jensen replacement so he adopted a UK-made Goodman. However, disaster struck when somebody poured beer in the amp in Germany around 1963 'and it never did sound right afterwards'. Lee abandoned it in disgust and returned to England with a Fender Bassman, his Supro days behind him.

Jimmy Page

Page put the Supro brand back in the spotlight in a 1977 interview with US journalist Steve Rosen. He revealed that he'd used a Supro amp for all of 1968's *Led Zeppelin I*, and had returned to it a couple of years later to plug in a Telecaster and record the solo for *Stairway To Heaven*. He described that epic guitar break as 'a different sound entirely' to the first album, praising the Tele/Supro pairing as 'a good, versatile set-up'.



So the names of Page and Supro were now linked. In a 1991 interview he described the amp, reputedly also used on the second Led Zeppelin album, as possessing a 12" speaker. This points towards the 15W, single-speaker 1624T Dual-Tone, but it has also been suggested it was actually a modified 1690T Coronado, made in 1962, in which Page replaced the two 10" speakers with a more easily overdriven 12" unit. A 1606 has also been suggested.

A postscript to this mystery comes with the suggestion that the Supro combo Page gave to the Rock & Roll Hall Of Fame for inclusion in its Led Zeppelin exhibit is a Coronado acquired in 1974, long after the early Zep LPs were recorded. But then he has claimed to have owned 'as many as 50' small Valco amps back in the late '60s and early '70s, so we shall have to keep guessing...

Randy Bachman

Legendary Canadian gear collector Bachman told *Guitar & Bass* of his fondness for Supro amplifiers in 2010, when he reunited with Overdrive buddy Fred Turner to record the Bachman & Turner album on which he was looking to play 'Jimmy Page, Clapton, Jeff Beck-influenced guitar lines, old Howlin' Wolf and Muddy Waters kind of things'. He teamed old Silvertone, Harmony and Danelectro guitars with vintage amplification.

'I got some Rickenbacker amps and Supro amps, similar to the legends,' he recollected. 'You hear about Jimmy Page using his Danelectro or Telecaster into a Supro face-up on the ground with a mic hanging over it to get a great sound. I did stuff like that, and was thrilled with the guitar sound I got.'

The 10", 14W Airline combo was designed as a complement to the Airline guitar, so-called because its body resembled a map of the United States. 'Designed especially for your convenience' was the strapline for this combo, making the point that the purchaser was benefiting from 'years of engineering know-how'. At this point, Supro was still offering a Hawaiian (lap steel) guitar with a complementary amp in a 'Student Deluxe' set. As the '50s went on they offered a 1615T tremolo combo for the accordion, hedging their bets in case rock'n'roll became a fading phenomenon, while the late '50s saw combos like the Comet, Spectator, Holiday and dual-speaker Rhythm King marketed under the enticing slogan 'Playing is easy when power does the work'.

By now, two of the three combos that have since become Supro standards – adopted by rock and blues players for the ease with which they can be driven from a compressed, clean tone to a warm overdrive – were moving centre-stage. The 15W, single-speaker 1624T Dual-Tone combo and the more powerful twin-speaker 1690T Coronado utilised nine-pin 6973 tubes and would remain in the Supro catalogue throughout the '60s. 6973 tubes look superficially like EL84s but, in the words of one commentator, 'deliver a distinctly American voice'. The Dual-Tone was upped from an original 15W to 24W, while the 35W Coronado was eventually fitted with the more powerful output stage found in the Thunderbolt model.

Introduced in 1964, the Thunderbolt was Supro's third classic. It was also their definitive bass combo... in theory. Its cathode-biased 6L6 output section delivered 35W through a 15" Supro TB15 speaker mounted in an open-backed cabinet. But the Thunderbolt did not have nearly enough power to deliver bass in a gig situation, and four-stringers who turned up the volume were doomed to disappointment – not only did the speaker and tubes distort, but the baffle board that held the massive speaker also vibrated. The

With 40W and two 12" speakers, the Big Star aimed to compete with Fender's Pro Reverb

Amp currently for sale at www.vintageguitarboutique.com

Rear view of a 1960s Thunderbolt

Klingan Guitars

1961 Supro Super Model 1606

THE NEW BREED

In the mid-2000s Fender amp designer Bruce Zinky left to start producing high-quality boutique amps under his own name. He then acquired the rights to the Supro brand, and New York-based manufacturer Absara Audio shipped its first Supro reissues in May 2014.

The new range was headed by the iconic Thunderbolt plus a 'hot rod upgrade' designated S6420+ offering a choice of 35W, 45W and 60W outputs via a three-way rectifier switch. The 1624T Dual-Tone was offered with a footswitchable tube tremolo, while the 2x10 1690T Coronado combined a 35W dual-6L6 output stage with a pair of custom-designed 10" speakers. The range was completed by the new two-channel Thunderstorm, with a similar three-way output choice to the S6420+.

It would be difficult for the new Supro concern to market reissued budget amps at a premium price point, so the new Dual-Tone has a UK street value just south of £900. *Guitar & Bass* reviewer Richard Purvis concluded that, judged on its merits, the Dual-Tone went from 'blackface cleans to spitty garage' and was 'a light, practical combo that delivers big, raucous tones with a warm American heart'.

The Galaxy attracted the attention of Eric Clapton and Joe Perry, while at one time Blues Saraceno owned three Big Star combos

makers' solution of adding a wooden brace across the speaker hole and another brace on the back of the baffle board improved its performance, while the rectifier tube gave way to solid-state rectification. But bass players were still not satisfied. As a guitar amp, however, the Thunderbolt combined the heavy bottom of the 15" Jensen with the raw tube distortion bassists shunned, and – like Fender's Bassman – it was soon adopted by guitarists looking for headroom at an affordable price. This is the combo Hendrix is said to have used early on.

Airline was the brand name used for musical instruments sold by retail giant Montgomery Ward, and Valco created a Thunderbolt clone for them. The model 62-9020A came with dark brown grille cloth and a different logo, but was the same amp with the same circuit as its Supro equivalent.

The Big Star, introduced in 1964, has been described as a poor man's Twin Reverb – but its warm, thick tone was more in keeping with Supro's existing products than Fender's trademark clean jangle. Once memorably referred to as 'looking like a '50s kitchen appliance' with its turquoise faceplate and gold logo, the Big Star offered 40W through a pair of Jensen 12" speakers and two channels – clean and reverb/tremolo. While the reverb is limited, the tremolo is impressive.

The reverb-less Galaxy model is said to have attracted the attention of Eric Clapton, while Joe Perry has also been pictured with one. The Big Star is relatively large for a Valco, but would still not have sufficed for live work without being mic'd up. And while combos from a few years earlier command high prices, the less fashionable Big Star and Galaxy have emerged as affordable vintage options. Top West Coast session man Blues Saraceno owned three Big Stars at one time, agreeing with one internet blogger who said: 'It doesn't have a lot of gain... but it's the creamiest-sounding amp on the planet.'

The mid-'60s saw Supro wake up and smell the coffee. While the cover of the previous year's catalogue had portrayed a classical conductor promising 'the stirring sensation of concert-hall sound', the new publication showed – shock, horror! – a disembodied guitar player. More than that, the focus had switched from the combo to amps and cabs. Fender had been offering these for several years, and Supro was belatedly ➔

Left: Clapton's name helped this mid-'60s Sportsman head sell for £19,000 at Bonhams

Left, the 'concert hall sound' of the 1965 range; above, a mid-'60s Statesman rig

Courtesy of www.vintageandrareguitars.com

Above, a '66 Model 24; below, a current 1624T

following suit. Pushing out 70W through two 12" Jensen speakers, the top-of-the-range Statesman, featured on the catalogue cover, retailed for $450; country star Travis Tritt owns an immaculate example that has been featured in vintage amplifier books.

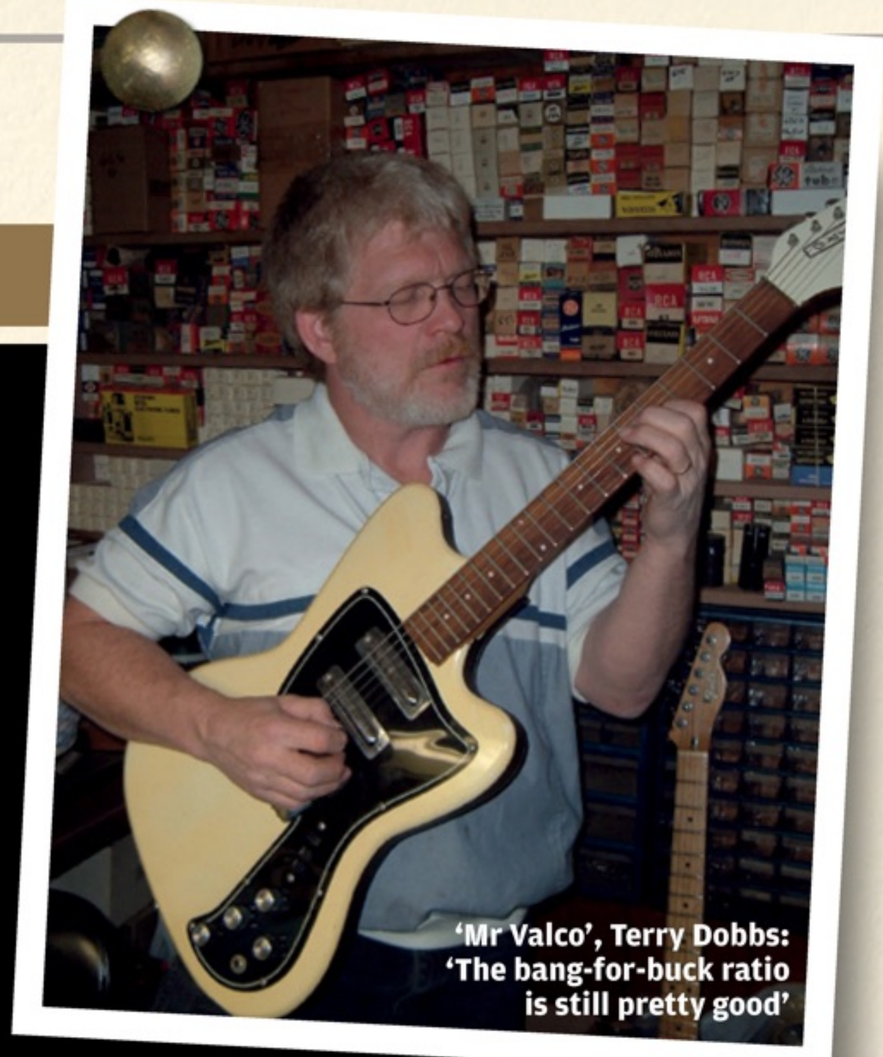
The 35W Sportsman was a similar physical size to the Statesman but a hundred bucks cheaper, reflecting its simplified layout and less powerful output. Bass players were offered the 70W, 2x12" Taurus, 'designed to be seen as well as heard'. A range of combos was still available, headed by the ever-dependable Thunderbolt, but its trademark blue 'rhino hide' vinyl would give way to black, Fender-esque tolex in 1967.

By now the end of the road was in sight. An ailing Valco briefly amalgamated with guitar manufacturer Kay, folding soon after in 1968. It was a sad end to a company that had never really competed with Fender; then again, it had always sold its product on price rather than style. With Marshall and others offering volume aplenty, Supros seemed more underpowered than ever.

But for every door that closes, another opens. The year Supro's parent company ceased to trade was the year a new rock band, Led Zeppelin, entered Olympic Studios in London to record their debut album. It was fitting their music had blues roots, given Valco/Supro's Chicago base... and the recent return of the Supro name to the marketplace has brought things full circle.

MR VALCO

Indiana-based amp technician Terry Dobbs is known as 'Mr Valco'. He kindly took time out to share his knowledge and advice...



'Mr Valco', Terry Dobbs: 'The bang-for-buck ratio is still pretty good'

How did Valco amps catch your interest?
I've been servicing Valcos and other amps for 25 years. What got me back into Valcos was an amp and guitar my grandfather gave me when I was 12, a small Supro amp and a Danelectro Pro guitar. When I was 17 my family moved to a new house and my Supro went missing; I never did find out what happened to it. Years later I got out the old Danelectro and thought I would just love to find an amp like the one I had, so I started looking for it. The amps weren't too hard to find and not expensive so I began collecting them. I soon realised some didn't sound right and needed servicing, so I started learning how to fix them. I developed a passion for them and still have it. I still gig on a regular basis too, and use them often – no other amps sound like them.

Why have Supro amps become collectable?
I remember when Supro amps were easy to find and inexpensive. Back then, as now, tweed and blackface Fenders cost much more than a comparable Supro. I found that the Fenders, while they do sound great, didn't sound twice as good just because they were twice the price. Supros have a voice of their own that I really like, and more players are discovering that. The Jimmy Page 'mystery' Supro amp was a factor in exposing players to these amps too. You sure don't see as many for sale as you used to; people are hanging onto them these days.

What gives them the tone they're known for?
Early Supro and Valco amps had a thick, organic Chicago blues-type tone and used circuits that were typical in that era. The circuits were reconfigured starting in 1957, changing over to their own unique designs. Both periods used lower B+ voltages in their circuits than comparable Fenders. They used cathode bias on the output tubes and the tubes were biased for high current, high AB and often very close to class A. They began using ceramic disc capacitors instead of the paper and foil caps they used before 1957, choosing lower values that resulted in a sharp, aggressive sound with no flub in the bass frequencies.

With very few exceptions, Valco used the same style of floating paraphase inverter in their push-pull amps from the earliest to the last models and that is a large part of the sound character and break-up. Pre-'66 Supro amps used just enough filter capacitance to make the amp work without hum, and this resulted in a looser, more 'forgiving' response. After '66 Valco went with heavy filtering, giving a stiffer feel and more headroom, trying to compete with other companies for the rock'n'roll market.

How do models differ in output and tone?
The characteristic Valco tone is present in about all of the models they produced from 1957 and forward. Obviously Wattage, clean headroom before break-up and speaker configurations defined the different models – but, to me, they break down into three categories: higher-power amps with 6L6s or 7027s, lower-power amps using 6V6s, and the amps that used 6973 output tubes. The pre-1957 amps had a different sound, very good in its own right.

What about non-Supro Valco-made amps?
Indeed, you can find the same or similar Supro circuits in brand names like Airline, Bronson, McKinney, Dwight, Atlas, Excelsior, Harmony, Gretsch, National and others. Supro-branded amps command higher prices because of the collectors' market, but players can still find good deals on these 'off-brand' Valco amps.

Are they a worthwhile buy for the money?
Most of them are. The Thunderbolt and the 1624T or Model 24 are priced pretty high these days; they're great amps and in demand right now. If you are patient and willing to search for good deals or off-brand examples, you can end up feeling really good about the value you can get. Compared to tweed and blackface Fender amps, the bang-for-your-buck tone ratio is still pretty good.

What are the best buys, and what should people look out for?
For amps with 6973s the 1600-series Supro Supreme amps are hard to beat, and you can still find them for reasonable prices. The Gretsch 6156 and the Airline 9023A are also a lot of amp in a small package. For higher-power amps the Gretsch 6159 and the Supro 1688T are still not in the stratosphere price-wise and are great amps. The small, single-ended amps like the Supro 1606 and the Gretsch 6150 can be bought for under $500 and still have the Valco sound with a nice class-A break-up.

Things to watch for are replaced speakers and output transformers. Sometimes the output transformer was riveted to the speaker frame; if the speaker blew, they would toss the OT with it and sub in one that didn't match well, and use a funky speaker. Watch for excessive rust on the chassis and transformers, although there are more choices than ever today when it comes to original-style transformer replacements. Look out for circuitry that has been heavily modified or serviced in a less than neat and tidy manner. Above all, let your ears be your guide.

You can contact Terry via www.valcoamp.com

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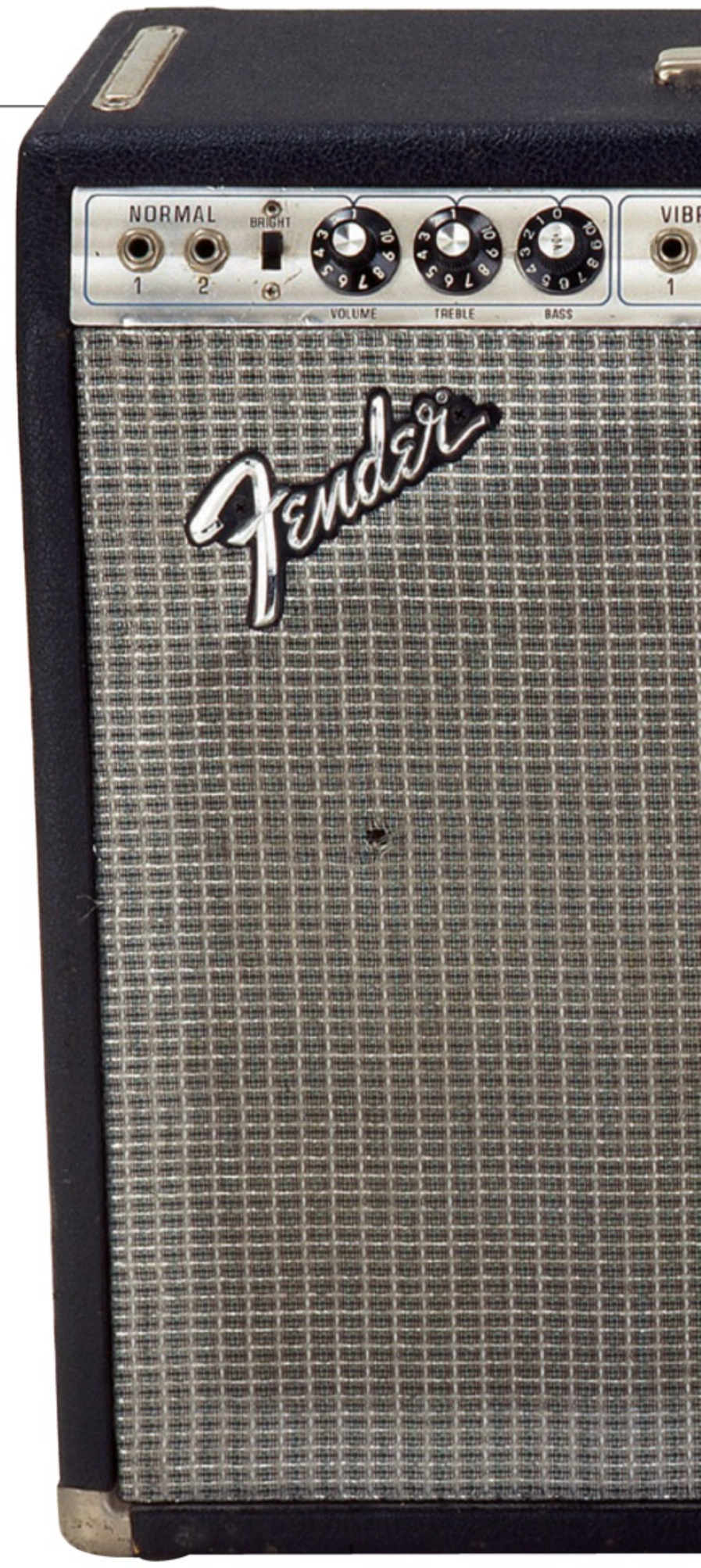
Fender MENDER

Maximising your 'silverface': Part 1

COMPARED TO MOST HANDWIRED VALVE AMPS on the market, your bog-standard '70s silverface Fenders are going for a song – and they can be as robust and toneful as the boutique boys with just a little technical know-how. In this three-part series, musician-turned-amp-modster **Brinsley Schwarz** tells you how to make the most of these well-built (relative) bargains. Parts 2 and 3 will help you 'blackface' your silverface and undertake basic modifications. But first up, getting to know your amp...



During the later mid-1960s, Fender (by now owned by CBS) made alterations to their range of amplifiers which, in the opinion of most, left them as pale imitations of their predecessors. In these articles we're going to look at how to rework these amps to earlier, better standards, and also at what modifications can be made to make them a little more versatile and suitable for modern use.

The amps we're concerned with are known as 'silverface' because of their silver control panels. Introduced in 1968, they are valued far less than the earlier blackfaces (CBS bought Fender in 1965, but changes during the transitional years were gradual). The two ranges were basically similar, mostly using the same circuitry, layout and transformers. But the differences, although minor, are crucial; and, combined with a downgrading in component quality, resulted in a loss of tone and playability that cost Fender's reputation dear. Fortunately, most of the changes are reversible and silverfaces can be made to live.

Inevitably, in any article about amplifiers there's bound to be some tech talk, but I'll try to keep it simple. The intention is not to persuade you to start digging around inside your amps – although that's how I got started – but rather to help you to understand a little of how things work, how and why changes should be made and what's possible, and to help you get the best from your amp.

Some of this information can apply to all valve amps, but I'll be concentrating on these old Fenders, mostly with two channels, reverb and vibrato (but not including 70W and 130W versions, which are beyond help). I'll also be including some general tips, which will be indicated in italics.

See the 'Warning!' sidebar about the dangers of messing with amplifiers. They can be extremely dangerous even when switched off and disconnected from the mains. There is a simple procedure to avoid the dangers, so please read the warning until you understand it, and ideally do some further reading, in books or online, about how to work safely with amplifiers. We won't be opening up the amp in Part 1, but to undertake the steps in Parts 2 and 3 you'll need to have a full understanding of the safety issues involved.

VALVE JOB

To start with let's go over the exterior layout of the amp and how you can get the most from what's there. I'll always be looking at the amp from behind and the right way up (see Diagram 1 over the page). On the far right are the two preamp valves; the furthest to the right is **V1**, the preamp valve for the Normal channel. This should be a 12AX7 (or its European equivalent, ECC83).

TIP: *If you don't use the Normal channel you are wasting a valve – it's on and using itself whether you are using it or not – so take it out and keep it as a spare. Also, the Normal and Vibrato channels share a small bit of circuitry, and removing one of the valves makes the other one a bit more lively.*

V2 is the Vibrato channel preamp valve and is also a 12AX7. Whichever channel you use, choose its valve with care. Not all 12AX7s are the same, different makes have different characteristics – just as different makes of guitar strings have – and the 12AX7 comes in many guises. It's worthwhile investigating

WARNING!

Potentially lethal voltages are present in guitar amps, even when they are switched off and disconnected from the mains. Filter capacitors store voltage which can remain in the amp and be discharged through you. There is a simple procedure to discharge the caps, which you should follow before opening up this type of amp, or indeed any other:

Turn on the mains/power switch on the amp, wait a minute and then turn on the standby (you should always wait a minute before turning on the standby to protect your power valves by letting them warm up gradually). Wait a couple of minutes and then turn off the mains/power switch on the amp, leaving the standby on. Wait a couple more minutes then turn off the standby and disconnect the amp from the wall mains. This will reduce the DC voltage inside the amp to less than 10 Volts – but you should check this with a multimeter before proceeding.

This author and *Guitar & Bass* assume no responsibility for any damage whatsoever to persons or property that may result from this article.

this, and if possible buying from a reputable supplier of quality, tested valves, as the right valve can make all the difference (see the *Tube Tasting* feature on page 26).

Next is **V3** – this is the reverb send valve and should be a good-quality 12AT7 (ECC81) if you want good reverb.

TIP: *The reverb driver is in fact a little class-A amplifier on its own, giving about 1 Watt into 8 ohms. Try plugging a small speaker into the reverb send socket, remove the driver valve (V6), or turn down the master volume control if you have one, and you've got a 1W practice amp.*

V4 is the reverb return and mix valve. Here the vibrato channel gets a little top boost and is mixed with the reverb signal. Use a good-quality 12AX7; a lot of noise problems can arise in this part of the amp and a good valve here helps.

V5 is the one that creates the vibrato; a working 12AX7 is sufficient.

TIP: *The vibrato circuitry is switched on in the amp, to its detriment, whether you're using it* ➔

or not. It is possible to fit a new switching 'intensity' pot which really turns the vibrato circuitry off.

Last of the preamp valves is **V6**, which is the phase inverter or driver valve. These amps are push/pull – that is to say that one power amp valve (or pair of valves) amplifies the top half of the soundwave (positive) while the other one (or pair) amplifies the bottom half (negative). The driver valve and its circuitry takes the preamp signal and splits it into two signals, one positive and one negative phase, for the two halves of the power amp stage. Always ensure your driver valve is a good one, and change it whenever you change the power valves. If your amp turns on and lights up but there is no sound from anywhere, check the driver first.

That's it for the preamp valves. This is the first place where your tone is shaped, and using the right (not necessarily the most expensive) valve can help. You can change your amp quite a lot here.

To dabble a little and find out what different valves do, try a 12AY7 or a 12AU7 in V1 for a warm, ultra-clean blues tone, try a Chinese 12AX7 in V2 for grainy gain and an ECC81 in V6 for an efficient and balanced driver stage. Experiment – preamp valves aren't expensive and you can always use them somewhere if you don't want to stick with the changes.

TIP: *Preamp valves are often covered with metal cans and you can remove these for better tone. I know, you're thinking 'more mumbo jumbo', but here's why it's true...*

Inside the valve there is an element called the cathode, which sits at the centre of another element called the plate. The cathode gives off electrons and the plate uses a positive charge to attract them. This is part of how the valve works. OK, now put a metal can over the valve. Connected to ground via the chassis, the can is negative with respect to the plate. The electrons, which are your tone, are attracted to the positive plate but repelled by the negative can and are thus confused, just like your tone. Try this: take the cans off your valves, turn your amp on and play, listening critically. Now put the cans back (take care as the valves are hot) and play again. Case proved... though if this causes your amp to becomes noisy, you'll have to put the cans back one at a time until the noise goes.

Find-a-Fender!

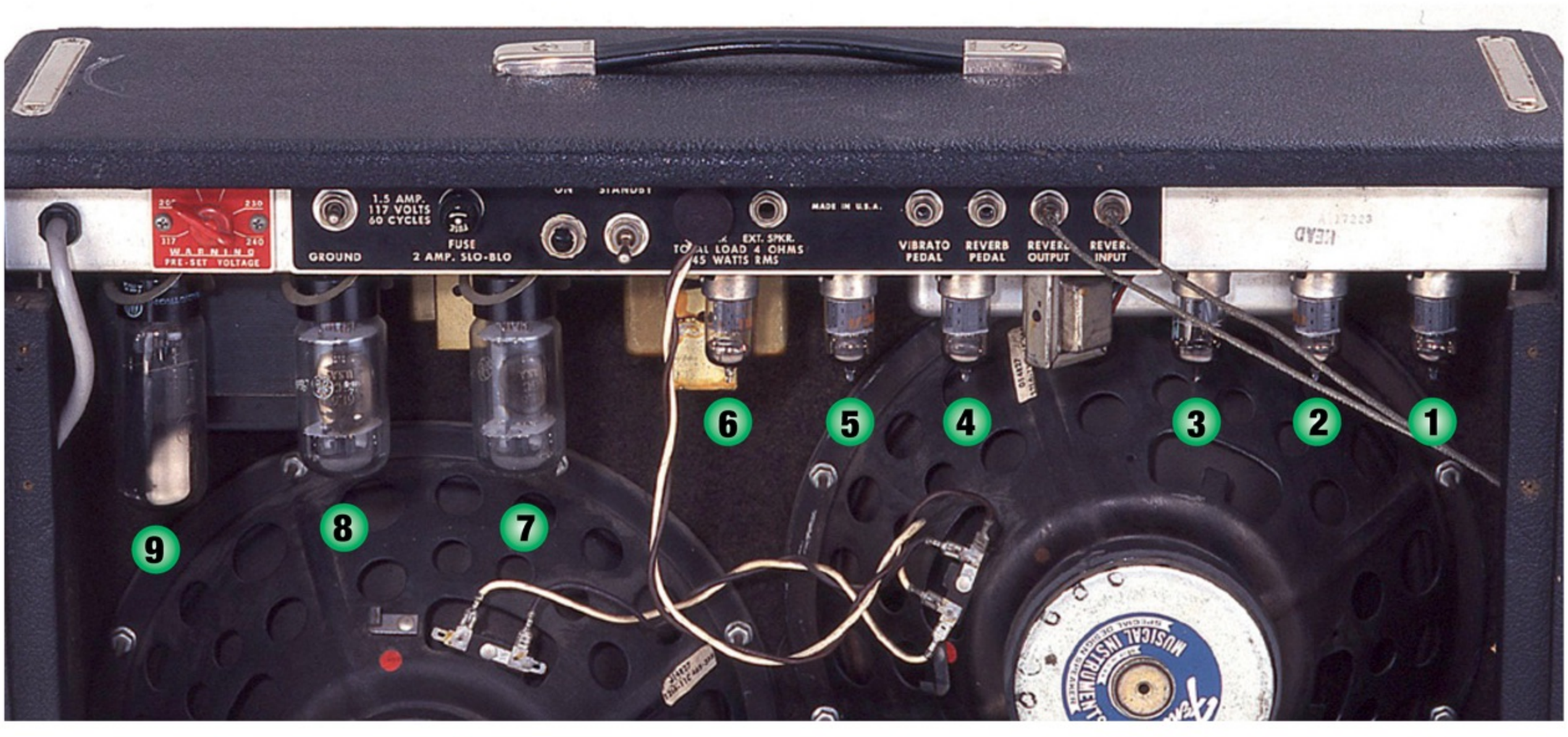
There are a number of early-'70s Fender amps available on the second-hand market which are appropriate to this feature. Many have been used as real gigging workhorses over the years and will be in varying states of disrepair, so it's worth assessing any necessary repairs that will have to be made before you can even begin the procedures discussed on these pages. If possible, take an experienced tech or knowledgeable hobbyist with you to help assess an amp's value and condition.

The following is a brief guide to some of the main two-channel models with reverb and vibrato worthy of 'blackfacing' and basic modification. Note that earlier models without a master volume control are generally considered more collectable – and to some ears more tonefully desirable – than those with the extra knob.

- **Pro Reverb:** A 40W 2x12" combo (the 'Baby Twin') which can make a great blues, country or rock'n'roll amp with a few slight modifications.
- **Vibrolux Reverb:** Essentially a Pro in a 2x10" combo format, though models built from '68-'70 were rated at 35W.
- **Super Reverb:** This 40W 4x10" combo is considered the 'King of Clean' in its blackface form by countless notable blues players (though it does a pretty mean crunch too), the knock-on effect of which means it's somewhat rare – and pricey – in the silverface version.
- **Bandmaster and Bandmaster Reverb:** 40W and 45W heads respectively, the first with vibrato but no reverb; each originally partnered a 2x12" cab. Obviously an amp with the original matching cab is more valuable.
- **Deluxe Reverb:** 'Only' a 22W 1x12", but a desirable club and recording amp due to its high gain factor and hot-running 6V6 power valves, meaning it's no less expensive than the bigger amps (sometimes more for early models in good shape). Long acknowledged as a classic in the USA.
- **Twin Reverb:** Probably the most famous Fender of all time – and the one seen on the most bandstands. 85W 2x12" combo, super-loud, super-clean. Steer clear of the post-'76 models with boost circuit and other internal changes.

POWER RANGER

Next along the back of your amp come the power valves. These amplify the preamp signal and provide the power (Watts) to drive the speakers. A lot has been said already about matched power valves and I don't want to dwell on the debate here, but there are some relevant points. Power valves can come matched and graded. Grading enables you to



choose whether your power stage has clean headroom or early drive and keep it that way by renewing with same-grade replacements. Matched sets can last longer, since they are balanced with respect to bias and current and so are all hopefully working optimally together. Sound-wise, they can only be as matched as the driver valve and stage that precedes them. Do you like the tightness that matched power stages may give you or do unmatched stages encourage a looseness and harmonic complexity that gives a fat tone? You pay your money... and the only way to decide is to experiment and determine what's best for you.

Last of the valves is the rectifier, on the extreme left. All amps have a rectifier; it can be valve or solid-state. The rectifier changes AC voltage into DC, which most of the amp uses. Valve and solid-state rectifiers sound different. Put very simply, here's how this works: your amp is turned up loud but you're not playing, everything is on idle, then you play a note. The power valves' demand for current shoots up; the solid-state rectifier says 'no problem' and the valve turns full on, the front end of your note plays loud and then decays naturally as it dies away.

But the valve rectifier doesn't work like that; the demand for current isn't met immediately, the valve can't turn full on instantaneously, and so the front end of your note sounds a little squashed. Then as the note decays and the demand for current relaxes, the rectifier can produce and the note swells, almost getting louder as it decays. This is a simple description of compression (also referred to technically as 'sag'), and amps with valve rectifiers have this squashy, compressed and singing quality when turned up. It's simple to convert valve rectification to solid-state – you can even get a plug-in unit. But going the other way round, although possible, is much more complicated.

ANY OLD IRON

The rest of the amp consists of the mains transformer, situated on the left; the choke, which is a small filtering transformer; the output transformer, which matches the power valves to the speakers; and the reverb drive transformer, which is the little one between V3 and V4. You don't need to know much about these, just that they should be clean and free from rust, so don't store your amp in the garden shed where moisture and extreme temperature changes can get at them. For the health of your output transformer, recommended speaker impedances should be adhered to.

TIP: *If your amplifier works but seems to overdrive or distort early, you could have a broken choke.*

Lastly, let's locate the filter cap box, which is the large flat box behind the preamp valves. Filter capacitors can be extremely dangerous and have been the subject of much discussion and controversy. Their renewal or upgrade will be one of the subjects included in Part 2 when I will go through how to 'blackface' your silverface Fender amp.

One final word... silverface Fenders are potentially really good amps. They are handwired and easy to work on. In the USA upgrading and modifying these amps has been commonplace for years and has caused their value to rise slightly, but they can still be had cheaply. Advertised prices in this country have soared, but it's easy to spend a lot of money on the right valves and speakers, upgrades and mods to get the amp working properly.

A price that may be fair for an example in mint condition, with rust-free transformers and good speakers, will not be fair for one of the many amps that have been badly mistreated and are in need of lots of TLC. The price you pay should reflect this and not the faulty salesman's logic: 'It's a Fender and it's old so it must be worth lots of dosh.'

My thanks to Dave Petersen, Dan Torres, Gerald Weber, Ken Fischer and Dave Funk, without whom I would not understand guitar amplifiers at all.

Amp Helpline

Q: Attracted by the great price, I bought a Carvin Nomad 50W combo. The amp sounds absolutely stunning, but I love the sound of Celestion's Vintage 30 speaker and – even though the Carvin speaker sounded great – I had to try the amp with the V30. I fitted the speaker and now the combination sounds the business. I am worried, however, that because my amp is 50W and the Vintage 30 is rated at 65W, as opposed to Carvin's original 100W speaker, I may damage the Celestion.

I also want to install Jensen P10Rs in my 65W 2x10" Music Man combo, which I use on low power all the time. Can the Jensen speakers handle this power output?

A: You do well to think carefully before undertaking any radical speaker-swapping, but in this case your ears are leading you down the right road. Unless you're running your 50W Carvin Nomad flat-out every time you play, a good speaker rated at or above the amp's output should provide long life and toneful service. The Celestion Vintage 30 is a sturdy unit, and probably capable of absorbing occasional peaks even above its rated Wattage – it shouldn't give you any problems in that setup. Also, it'll probably break up a bit more easily and sweetly than the 100W speaker provided (which is, no doubt, part of why you already like the combination so much). Go for it, and enjoy – just be aware that if you run the amp on 10 all the time you could eventually threaten the life of the speaker... but of course you'll be deaf and evicted long before that happens anyway.

Jensen's P10R is a great-sounding 'vintage reissue' alnico speaker rated at 25W per unit, meaning a pair in your 2x10" cab should comfortably handle 50W of power. If, as you say, you're running the Music Man on low power, they shouldn't give you any problems – and will probably be a real tonal improvement on the originals. If you feel you might occasionally be tempted to crank the combo, however, Jensen have also reissued their P10Q (and the less expensive ceramic-magneted C10Q), a slightly sturdier speaker rated at 35W per unit. All of these should be readily available in the UK – check with Hot Rox UK (hotroxuk.com) Watford Valves (watfordvalves.com) for availability.

Diagram 1. Valve line-up (photo left)

1. Normal ch. preamp valve
2. Vibrato ch. preamp valve
3. Reverb send valve
4. Reverb return/mix valve
5. Vibrato valve
6. Phase inverter/driver valve
7. & 8. Power/output valves
9. Rectifier

Return to FENDER

Maximising your 'silverface': Part 2

'WE CAN REBUILD HIM, DOCTOR... WE CAN MAKE him better!' Ahhh, yes – far from merely stopping at maximising your '70s-era silverface Fender amp's stock potential, ampaholic **Brinsley Schwarz** moves on in this second instalment of a three-part series to guide you through 're-converting' your all-valve tone tank into one of the most hallowed guitar amps of all time: a pre-CBS 'blackface' Fender combo

Continuing our look at silverface Fender amps, this time I'll go over how to rework these amps to 'blackface' standards. This will involve a simple rewire of one area of the amp and the straight replacement of some components elsewhere. Once again, please read and follow the warning printed on page 101 before you get into opening up and working on your amp. These are simple mods and old Fenders are easy to work on, but if you have even the smallest doubt about your abilities, take your amp to a qualified tech.

Also, there's a lot of information coming up in this and the next article which will enable you to have 'just a better amp' or 'a completely different one'. You may want to read it all before you decide how far you want to go and before you start buying up parts. When I started messing around with my Twin Reverb, I did little bits at a time as I read and found out more, often undoing and chucking away what I'd done a few days before. I tried out a lot of stuff before I got to the amp I have now – and what I'm doing in these articles is giving you what I found to work and be worthwhile, in the simplest terms. Of course may want to find out more, and there are plenty of sources from which to learn.

Again in this instalment, non-essential but recommended jobs and tips will be highlighted with italics.

BIASED OPINION

To begin with, let's examine how to rewire the driver and bias circuit. The bias circuit in silverface amps does not allow the amp to be rebiased, only for the bias to be balanced between the two halves of the power stage. This is not ideal and does not allow you to get the best – or even what you may choose to get – from your amp and the power valves you select.

What is bias? Well, valves were not designed just to be used in audio amplifiers; they were originally used for a whole range of other electrical functions – oscillators, non-audio amplifiers, switches, etc. They are versatile, general-purpose electronic devices that have to be 'pushed' into a particular operating area to become audio-frequency amplifiers. Bias is that push, a negative voltage applied to the valve to make it work the way we want it to. There are different ways to bias an amp, and different (often strongly held) opinions on which way is best and/or correct. I always bias by the 'measured current' method.

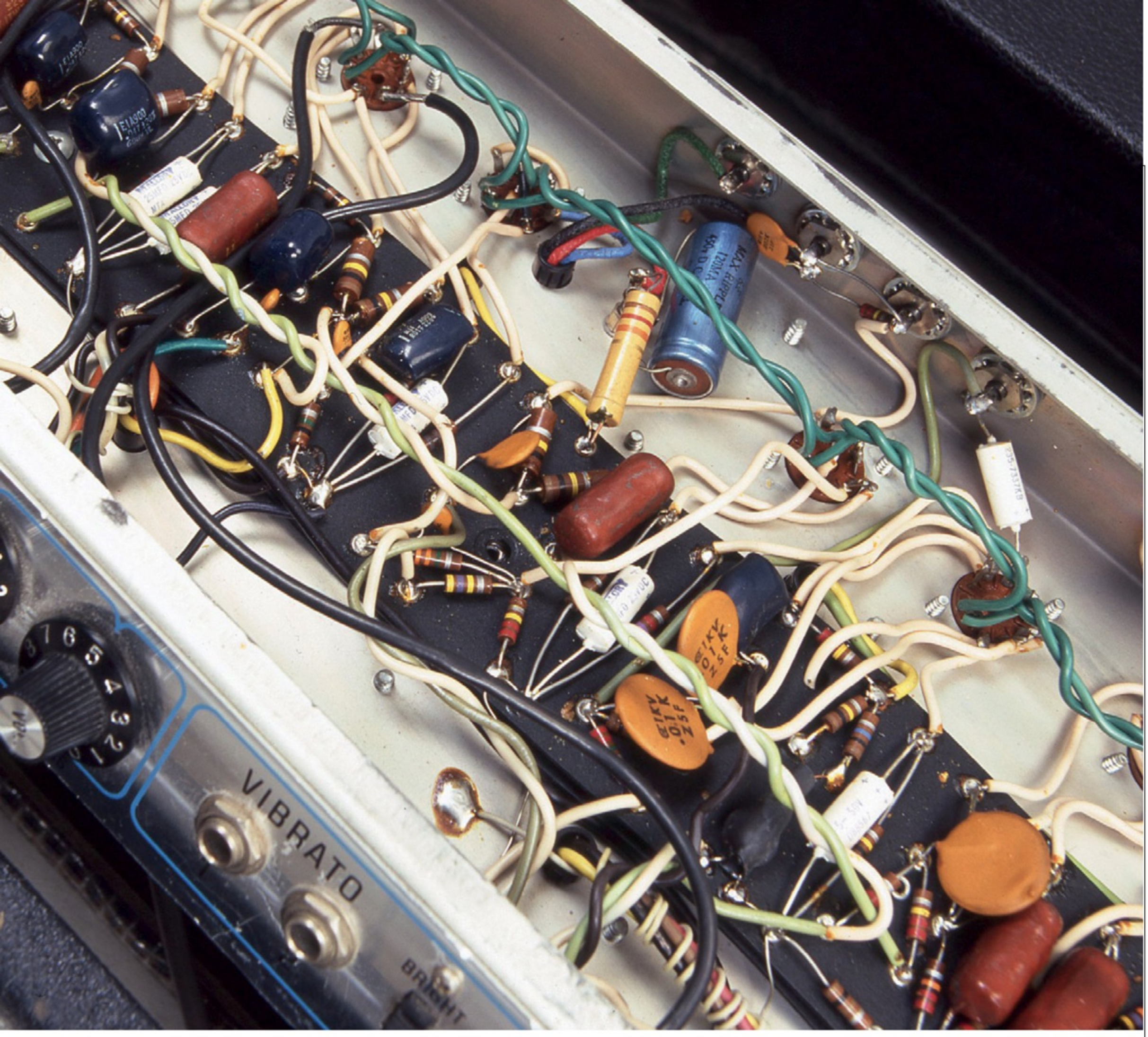
TIP: *Check out Ken Fischer in Gerald Weber's 'Hip Vintage Amps' book for more on the bias argument.*

Whatever method you choose to use, you need to rework your amp to the earlier spec. The driver circuit (powered by V6 – see Part 1 for the valve layout diagram) is also not exactly ideal, as it's weak and flat-sounding; the blackface design is stable, with more drive and gain. Diagram 1 (a & b) shows the differences, and you can see you have to change just seven or eight resistors and one wire. The new – that is, old! – circuit should liven up your amp and give you more gain, and the bias circuit will allow the bias to be adjusted correctly or to your taste.

Of course, while you're doing this is a good time to upgrade the four caps in the circuit as well. Speaking of which...

CAP-O-RAMA

The other real problem with these amps is that CBS/Fender seem to have embarked on a component downgrading policy. Throughout amplifiers there are capacitors which are either for tone shaping or for what is known as 'coupling'. Your tone goes through these caps and is affected by their quality. Coupling caps are used between valve stages: they separate DC voltage (power that the valves use in order to work) which



they don't allow to pass, and AC voltage (your guitar signal) which they let through. To start with, Fender changed from the really good blue tubular caps found in most blackfaces, to brown 'chocolate drop' caps, which weren't very good at all. Later, after the damage to their reputation from this and other changes became apparent, they changed again to somewhat better (blue drop) caps. Both these latter types can be improved upon and it's OK to just replace them with the same value, but better, caps.

TIP: *However, you can also use this opportunity to change the amp's sound for the better as well, by altering some of the values slightly... see Part 3.*

I use two makes as upgrades – they are Sprague, also known as 'orange drops', and Xicon. Sprague caps have been used in many top-end American amps for years and are, I guess, the favourites. Spragues sound warm, tight and controlled; Xicons are grainier, with a little more top end. Whatever you use, the caps must be rated for at least 600 Volts. Changing the coupling caps and the bass and middle tone caps to Sprague or Xicon, and the treble control and bright switch caps to silver mica, will give better, clearer, warmer tone and a sweeter top end.

This means a complete recap, between 15 and 18 caps. See Diagram 2 for the rest of these.

MOJO FILTER

Last in the component quality upgrades are the filter caps. These are not in the sound path at all, and are used to 'clean' the DC voltage that the amp uses. So how do they affect the sound? Surely if they're working that's good enough? Opinions differ here and there are no straightforward answers. Filter caps used in guitar amps are 'electrolytic', and they go bad with time. Their average lifespan to be working within correct spec is probably around 10 years, so if your amp has original caps (light brown cylinders with 'Mallory' printed on them), they probably aren't working as they were intended to when new. And here is the rub: if they ARE working and your amp works and sounds OK, then why change them at all? Well, all I can say is I have replaced the filter caps in lots of old Fenders with Sprague electrolytics and the amp always sounded better for it – tighter bottom end, more punch and quite a lot quieter.

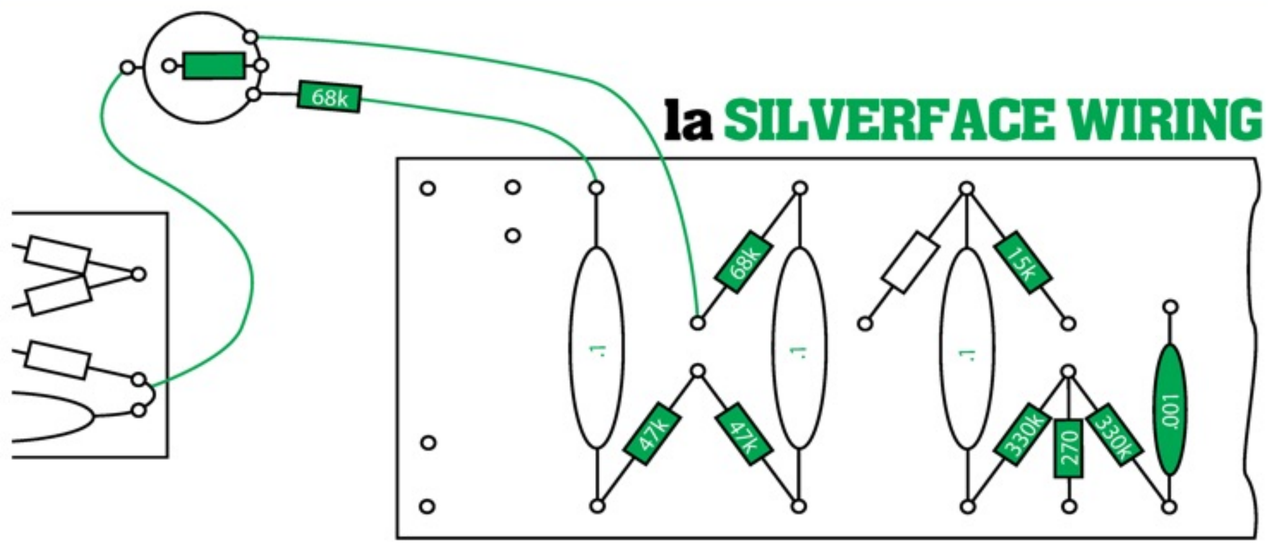
TIP: *To spot a broken cap, look for stuff oozing from either end, little 'blisters' in the rubber end seal, or broken/loose wires.*

There is another reason for considering a filter cap renewal, and this applies to all old amps. Cap failure can cause damage to your mains transformer. These cost far more than filter caps and in some cases it may prove extremely difficult to locate the right part. I'm not trying to scare everyone with an old amp into getting new filter caps – many are out there working away just fine – it's just another consideration.

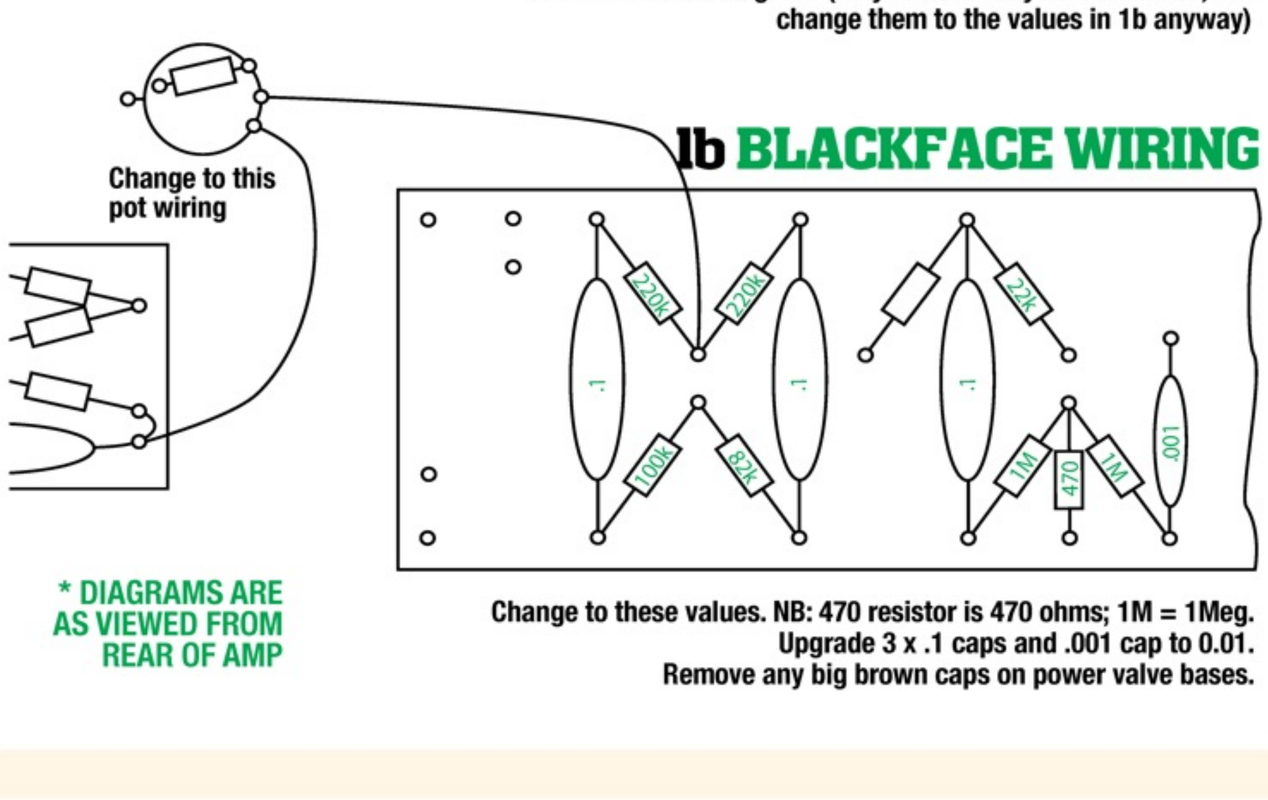
Messing with these things is dangerous, so as an added precaution to the warning instructions printed with Part 1, here is a second procedure to guard against an extremely unpleasant shock:

Get an insulated alligator clip lead, cut it in half and solder a 1k to 10k, 2-Watt resistor between the two halves then tape or heatshrink-wrap the join so that the whole thing is insulated. Having followed the ➔

Diagrams 1a & 1b. Wiring differences



Resistors and wiring connections that will be changed in the layout below are coloured green (they're not always these values, but change them to the values in 1b anyway)



* DIAGRAMS ARE AS VIEWED FROM REAR OF AMP

Change to these values. NB: 470 resistor is 470 ohms; 1M = 1Meg.
Upgrade 3 x .1 caps and .001 cap to 0.01.
Remove any big brown caps on power valve bases.

procedure outlined in the warning, carefully remove the filter cap box, attach one clip to the positive (+ve) end of the large cap at the left end of the board (usually 70 microfarads or 'ufs'), and put the other clip on the chassis. Repeat this with each of the 5/6 caps. This will make them safe. To double-check, use a voltmeter set on DC volts between the +ve of each cap and the chassis to read the volts left in the cap – this should read zero. If you're in any doubt whatsoever, get this done by a tech. We can't emphasise caution strongly enough here!

If you want to do this yourself, then obtain the correct value and correct voltage replacements and observe the correct polarity when installing the new caps. Electrolytic caps have positive and negative sides; the positive side is usually marked on the caps as '+ve' or simply '+', and they won't work at all (sometimes they'll self-destruct) if fitted the wrong way round.

TIP: *Filtering is done in stages, which are separated first by the choke and then by resistors. The first stage is usually made up of two large caps in series (generally 70ufs). You can change the sound of the whole amp by altering these two caps. Changing up to 100ufs will tighten up the bottom end and add a little punch; upping them to 220ufs will give lots of extra punch, especially good if you're going to include an overdrive channel (see Part 3).*

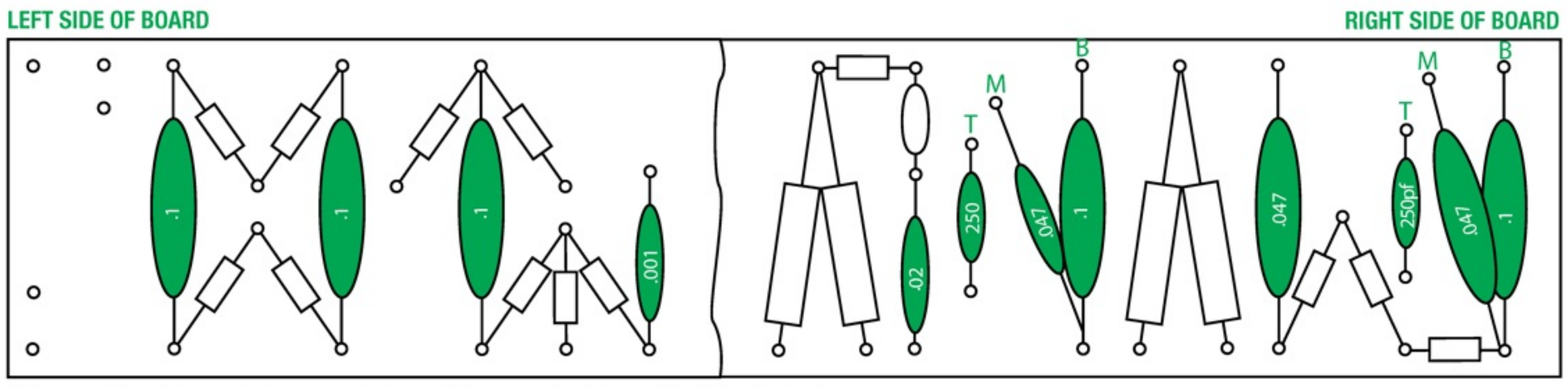
Next come three 20uf caps separated by two big resistors. The last cap feeds the two channel preamps and you can make the preamps a little more open-sounding by changing this cap down to 10ufs. The resistor keeps the stages apart, but also drops the voltage a little; by increasing the value of the last resistor you can lower the voltage in the preamp stages. This produces a 'browner' sound, more vintage and more ready to get gainy. Valve rectifiers, however, don't like to see big filter caps and so you should stick as close to the original values as possible in these amps.

I don't think it's worth doing this unless you're going to use really good caps – once again I think Sprague's are best. Mallorys are great too but not as easy to get. European and Japanese ones function correctly but don't sound as good. See Diagram 3.

PASSIVE RESISTANCE

Lastly, some of the upgrades and mods will require changing some resistors, and here's some more amp voodoo stuff. There are different types of resistor, they can be made from different materials, and we need to use the right ones. Old Fenders have carbon composite resistors – they're dark brown and quite large by modern standards, and these are not always readily available although they can be bought from specialist suppliers. Modern resistors are carbon film, metal film,

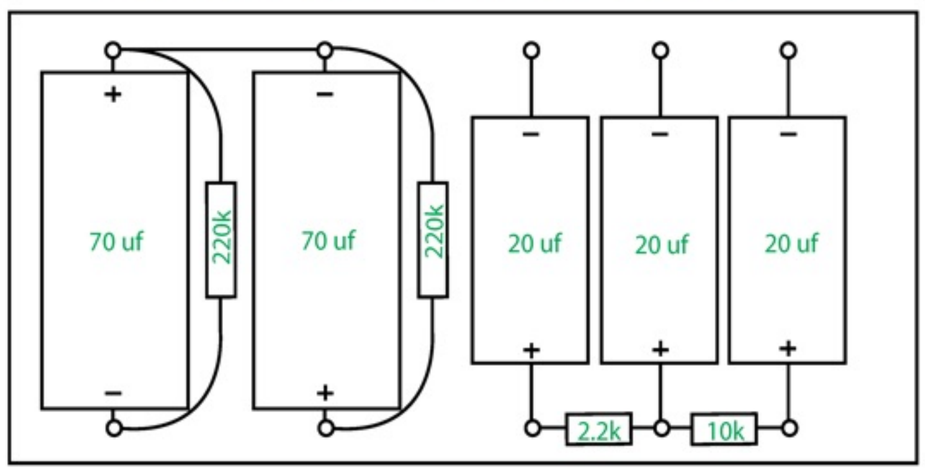
Diagram 2. Cap upgrade



All caps coloured green to be upgraded – and they can also be modified (see Part 3).
BMT = Bass, Middle, Treble. Treble caps (and bright switch caps, not shown) should be changed to silver mica – all others upgraded to Sprague or Xicon.

VIEWED FROM REAR OF AMP

Diagram 3. Filter caps upgrade



Replace 70ufs with 80ufs for same spec or 100ufs for firmer low end. Blackface spec has 1k resistor not 2.2k, and 4.7k not 10k. All resistors are 2-Watt.

VIEWED FROM REAR OF AMP

enamel or ceramic. Some insist the carbon comp ones sound best but carbon film resistors also good.

Ceramic resistors are best in just one place. This is to replace the 1W, 470-ohm resistors between pins 4 and 6 of the power valves – 4-Watt, 470-ohm ceramics are better and safer here.

Size is important. Resistors need to be at least 0.5Watt and also of a similar size to those being replaced. Obviously, as technology demands smaller components, large resistors have all but disappeared and are now relatively expensive, but you can still find them and it has been proved to me that they sound better. Well, stands to reason, doesn't it? Big components equal big sound, little components equal...?

In the final part of this workshop, I'll go through some simple modifications. Because these amps are made on a handwired eyelet board, it's easy to change components and fairly simple to change circuitry, and because there are so many valves you can build in high-gain circuits and FX loops if you're prepared to lose vibrato or reverb. For those who are intrigued and want learn more, there are some good books to read. *Inside Tube Amps* by Dan Torres, which is fun as well as informative, and *A Desktop Reference Of Hip Vintage Guitar Amps* by Gerald Weber are both good places to start, while circuit diagrams and easy-to-follow picture layouts abound in Aspen Pittman's *Tube Amp Book*.

But for now, please turn over the page for Part 3...

Connections

For supplies of Sprague and Xicon caps, various resistors and other components for your amps – as well as info regarding his forthcoming range of Grumble Amplifiers – you can call Brinsley on 020-8647-9771.

If you're wired to shop online and prepared to have goods shipped from the US, these are also good sources:

www.hoffmanamps.com Custom amp, transformer and handwired circuitboard kit builder who also stocks quality caps, resistors, valves and more

www.angela.com Stockists of a broad range of new and vintage 'NOS' components

Amp Helpline

Let us take this opportunity to point out a rare but potentially very hazardous danger lurking around the back of your valve amp, as brought to our attention by *Guitar & Bass* amp guru and Vox wizard David Petersen...

Most people who use amplified instruments are well aware of the basics of electrical safety. This awareness, together with the tight electrical standards adhered to by the major equipment manufacturers, results in a very low incidence of shock-related casualties, particularly when related to the total number of equipment operating hours. It would be fair to say that a performer using a commercially produced system powered from a standard ring-main and properly earthed stands a greater chance of being struck by lightning than suffering an encounter with the dark side of his/her equipment.

There is, however, an electrical risk that is unknown to virtually all those I have talked to about it. I once experienced it, but wrote the incident off as insignificant until a friend recently described to me how a similar thing had happened to him about a week previously, with frightening effect. The reason this risk is not more widely known is that it results from a fairly unusual, but by no means impossible, situation. In fact, it could happen to anyone in the course of setting up or looking for a problem in their sound-system. Nor would the system have to be a very powerful one.

What happens is this: you have your guitar or your mic connected to an amp; perhaps there's no audible output when there ought to be and you want to check a suspect speaker connection, or, as in my friend's case, simply disconnect the cables after the gig. For whatever reason, you have occasion to touch the amplifier's open speaker terminals, with some gain set on the volume control, and are holding an instrument that's connected to the input. Don't do it! You may well receive a shock at least equal to and possibly more powerful than touching the live side of the mains – with the same chance of injury or worse.

How is this possible? The highest-powered amps in normal use are able to generate only some 30 or 40 volts at the output. Conventionally, it would take about double this potential to create a shock hazard. The explanation lies in the high frequency of the resulting current.

Many, if not most, amps are wired so that the output is in positive phase with the input – that is, the output moves in the same electrical direction as the input signal. If you couple the output of a positive-phase amp to its own input via your body, which is among other things a reasonably good 1nF capacitor, you will cause the amp to drive itself into oscillation at a high frequency and with its full power capability. Now a 1nF capacitor (ie: you) can pass a fair bit of current at the kind of frequencies we're talking about. As the frequency increases, it takes less and less voltage to drive the current through it.

So our notional 'safe' 100 volts (fine at 50/60Hz mains frequencies) is drastically reduced when we consider an amp oscillating in the much higher 10/20kHz range. At these frequencies even a dozen volts, easily produced by most guitar amps, becomes dangerous, capable of delivering a heart-stopping 5 or 6 milliamps of current. My friend had switched his 200W-powered mixer off when he touched one of its speaker terminal posts with one hand, his guitar (patched direct) held in the other. Even the residual energy in the amp's smoothing capacitors enabled it to deliver a ferocious jolt, which could have had nasty consequences if it had still been powered up. Be careful out there!

David Petersen

Soul FENDER

Upgrading your 'silverface': Part 3

WHY STOP AT A GREAT-SOUNDING AMP WHEN YOURS can be fantastic – and custom-tailored to your own desires? In the final instalment of his series on silverface Fenders, **Brinsley Schwarz** takes soldering iron in hand once again to demonstrate some hot mods for cool rockers...

Time to show you some of the simple modifications that can be done to these easy-to-work-on '70s Fender amps, and also discuss some more comprehensive ones that would be too complex to explain fully in the space available here. Once again, follow all the instructions contained in the warnings printed on the previous few pages before you start work on your amp. As I've said before, I'm not necessarily advocating that everyone starts modifying their amps, but I hope to maybe awaken you to some possibilities. Also, understanding a little of how and why amps work should help you to get more out of yours and to make more informed purchases in the future. Once again, tips are printed in italics.

Also, note that while these silverface amps aren't yet up to the highly collectable status of Fender's blackface, brownface and tweed models, they're becoming increasingly desirable nonetheless. Even if you (and possibly other players) consider the mods discussed here to be improvements, any alteration of an amp from original could detract from its resale value. On the other hand, because these amps are simple to work on, these modifications are mostly reversible. Ultimately, you have to weigh it up for yourself: if these modifications appeal to you and you plan to keep the amp for a while – possibly a lifetime – then the rewards become self-evident.

TONE TINKERING

Since the Normal channel of your amp is probably lying dormant, this is the obvious candidate for modifying, leaving you with one original channel (the Vibrato one) and one altered one. The two channels come together later on in the amp so you can use a passive A/B box to switch from one channel to the other.

As I hinted in Part 2, there are some very simple changes you can make to component values that will produce a more open tone from your Fender. The original tone and coupling caps are usually big-value ones and these can give a sound that is mid-light or a bit bottom/top heavy, almost as though you're playing through PA speakers. Diagram 1 shows what needs changing: just three caps. The bass tone cap is usually a .1uf, the mid control a .47uf, and the coupling cap varies. Changing these to .02uf caps, the values used in older Fenders and Marshalls, will give a more natural guitar sound that feels easier to play.

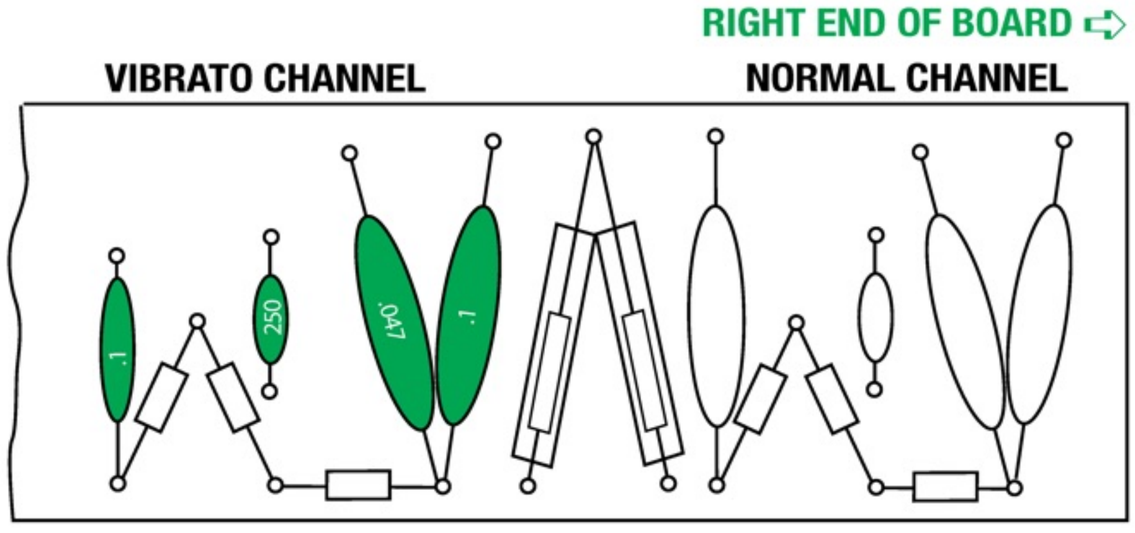
TIP: *I prefer this even as an original circuit in Fenders, so in a clean channel you could use .02 caps throughout, and I would suggest that you try it in your Vibrato channel... leaving the Normal channel for something a little more adventurous.*

HOT MOD

There is enough space on the circuit board for any one of the many preamps that use just one valve. Flicking through the back pages of *The Tube Amp Book* by Aspen Pittman will reveal old designs used by Fender, Gibson and Marshall, to name a few. Some of these would involve a different layout to the one in your silverface but the one I've chosen to show you is very simple to install. It produces a Marshall-type voicing and much more gain – and with humbuckers it can give mucho crunch.

Diagram 2 shows how. The Normal channel circuitry is all at the extreme right-hand end of the board; as you can see, you only need to change five caps, four resistors and one pot. You also need to build on a little extra one-cap/one-resistor circuit on a tag terminal between pin 8 of V1 and ground. As with all of this work, make sure you clean out all of the old wiring and desolder the eyelets so that you start afresh with a clean board. As I have

Diagram 1. Tone tweaks



Change coloured caps to .02uf and upgrade 20pf to silver mica 250pf

already said, there are many designs to choose from that will fit into the Normal channel space. There's no need to be restricted by the control layout either, and simpler preamps – like those found in tweed Fenders or Marshall's 18-20W types – will work and sound good. And if you're into it, you can mess around until you find something you really like.

MULTI EFFECTS

OK, now that you've got two different and very useable channels, you'll want reverb and vibrato to work on both. No problem – you just have to move a few parts and some wire. Over on the left side of the board there are two 220k resistors (red/red/yellow stripes), which mix the two channels together as they go into the driver circuit at V6. The left-hand one is usually marked with an X on Fender drawings and has a wire going all the way over to the output coupling cap of the Normal channel, also marked with an X (the wire twists around several other wires on its way across the board). Remove this 220k resistor and the wire but leave the other resistor with two wires going to it in place. Move both channels' treble caps, fit the two new 220k resistors and rewire, all as shown in Diagram 3. Now you have reverb and vibrato on both channels.

FUN WITH FEEDBACK

One more area that you can change to big effect is the feedback resistor. This is the only resistor in the driver circuit that we left untouched in the 'blackface' mod. Feedback is used to control the power stage and to stop it running away or oscillating.

As standard in Fenders from the '60s, the effect of the feedback circuit is quite heavy. Raising the value of the resistor will give you the effect of increased power-amp gain or lowered headroom. The resistor in question is shown in Diagram 4: it's 820 ohms. I usually raise this to 5.6k to make the power stage a little more lively, but you can go as far as you like; however, if your amp develops noise or stops making any sound at all (this is due to inaudible runaway oscillation/feedback), you'll need to back down the value until it's stable again.

FINAL FRONTIERS

The mods I've gone through have all been quite simple to do, and yet they can make a big difference to your amp. Since these Fenders are so easy to work on, you can go much further, with modifications that would be too complicated to go into here. But I can talk about them a little – and if you have sufficient experience yourself or know a good local amp tech, you can follow these up on your own initiative.

If you dump the vibrato you get another valve to play with and you can use this in conjunction with the Vibrato channel preamp valve, V2, to get a tweed Bassman or JTM45 channel. These are three-stage preamps but with two valves you've got four stages so you can add another stage to this to get big overdrive too.

If you dump the reverb as well, that gives you more valves to play with... and you've got enough space to include a valve parallel effects loop – which is essential if you run a rack digital FX unit, as your valve dry sound will be kept out of the digital soundpath and so remains intact. There'd also be room to put in a five-stage Soldano-type overdrive channel. Of course your Fender will never sound exactly like a Soldano, or a '59 Bassman or a JTM45, but it can take on those characteristics, with good crunch or heavy-duty overdrive.

My own Twin has a tweed Deluxe-style clean channel and a Dumblesque, Robben Ford-style lead channel, with a valve-driven parallel effects loop running at line level for ➡

Diagram 2. Marshall/high-gain

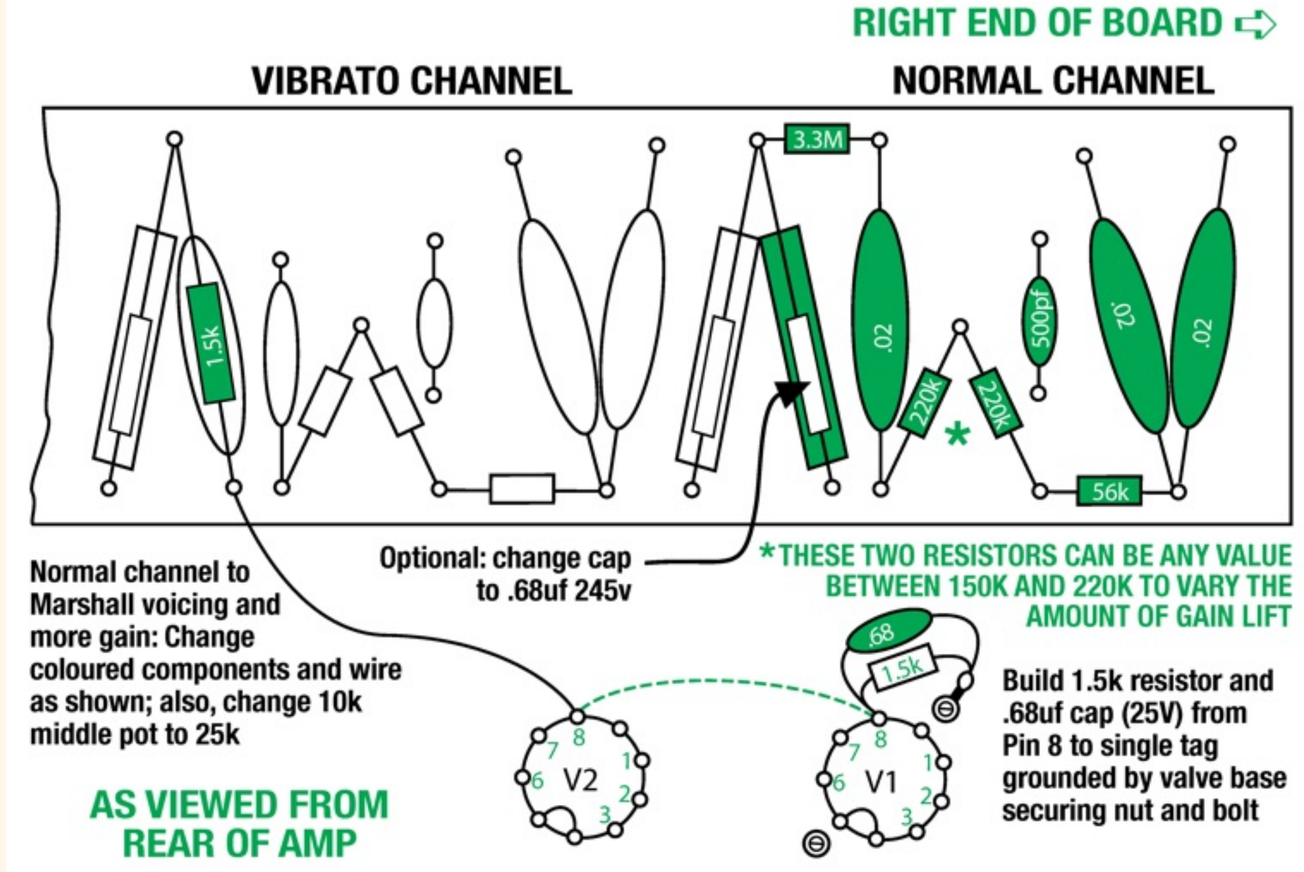
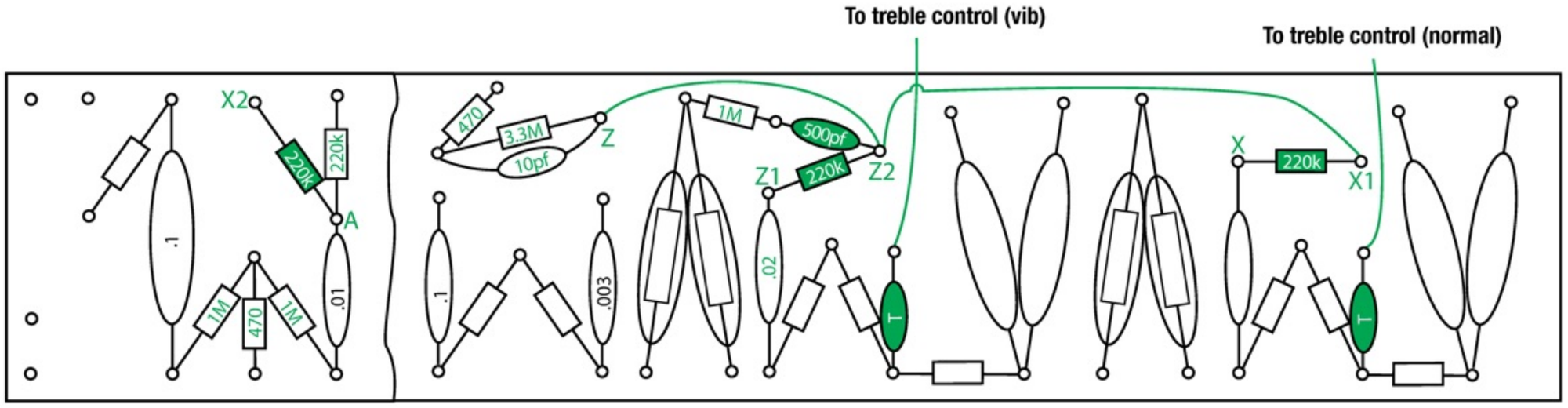


Diagram 3. Reverb & vibrato on both channels



DRIVER STAGE
- Remove wire from X to X2 and
- 220k resistor from X2 to A

VIEWED FROM REAR OF AMP

VIBRATO CHANNEL
- Move treble cap T as shown
- Move Z1 end of cap from Z1 to Z2
- Install 220k resistor Z1 to Z2
- And new wire Z to Z2

NORMAL CHANNEL
- Move treble cap T as shown
- Install new 220k resistor X to X1 and wire X1 to Z2

a rack FX unit. I've removed the vibrato and reverb circuits altogether and replaced the output transformer. I also split it into a head and 2x12" cab for easier carrying.

This amp obviously has very little of the original left, but even so it does still have that old Fender quality of sound. Of course, modifications like these are big projects and should not be undertaken unless you have some skill and knowledge, but if you spend some time and really get into this they're not as daunting as they might first appear. You can also see that your clean, clanky, tired old silverface Twin Reverb can be turned into a seriously funky amp, capable of fulfilling most modern-day requirements.

SPEAKER TWEAKER

The one remaining thing to be discussed is speakers. These were not fabulous when new in silverfaces, and by now they are usually very weary or broken, or have been replaced, often without much consideration for tone. There are different ways of looking at replacements, depending on the type of amp you want. Remember, you can make your amp quite a lot louder by using efficient speakers and also alter the tone with ceramic or alnico magnets. Electrovoice speakers are at least 3dB more efficient than most guitar speakers – that's about the same difference between 50W and 100W. Two EV10s in a Vibrolux, for example, will produce more volume and enable you to turn up without the speakers dying.

TIP: *If you have a small amp which isn't quite loud enough to use live but you really love the sound and you can't find a bigger, louder amp that sounds the same, then consider using more efficient speakers. The volume boost may well be enough to enable you to use the amp on stage.*

Jensens are being built again and are readily available. These would hopefully give your amp that vintage sound with good dynamics and tone. Also, speakers like these really jump and move air when you play a note, which makes them great for recording.

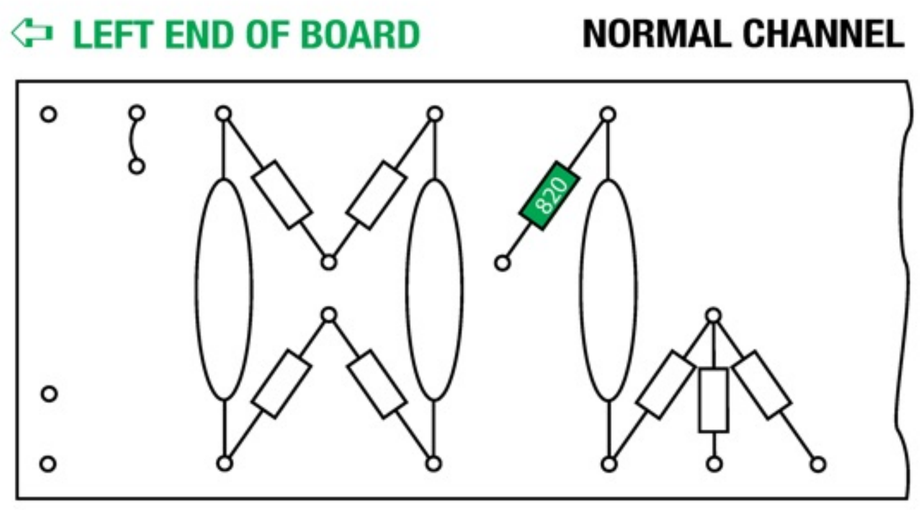
There are good 'vintagey' replacements available from the States – Mojo, Kendrick, Weber and Naylor spring to mind – many of which have had rave reviews. But I'm a bit wary of mail-ordering speakers from the USA... it's an awful hassle to return them if something goes wrong. So I normally turn to Celestions. They make a sort of 'better quality' range which includes the Classic Lead 80, Greenback and Vintage 30. These are reasonably priced and very useful as replacements in silverface Fenders.

Classic Lead 80s are my favourites in Twin and Pro Reverbs: they are clear and can take the clean power. Vintage 30s are also good, although maybe a little loose in the low end; to counteract this, a good trick is to use one Vintage 30 and one G12T 'Hot 100'. The latter has good firm bottom end and combines well with the grainy top of the V30. Celestion also make a G10 Vintage, which sounds good and is powerful, but I guess the Jensen 10" speakers would be my favourites for Super Reverbs. The main thing is to realise that speakers are a very important part of your amp and, if you need to change them, a little thought and perhaps a little extra expenditure could make a big difference.

Over the years most manufacturers, for whatever reasons, have not always fitted the best components available (speakers included), but sometimes those parts that have been readily available have luckily turned out to sound really good (Leo Fender's early use of alnico-magnet Jensen speakers, for example). The silverface era was not one of these lucky times, but with some effort and a little cash you can make yourself a fine amplifier.

My thanks for sharing their knowledge of guitar amplifiers go to Dan Torres, Gerald Weber, Ken Fischer, Dave Funk, Aspen Pittman and especially Dave Petersen for his continuing help and support.

Diagram 4. Friendly feedback



(Feedback resistor is coloured green)

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Gartone

Gartone
Regal 45

Turret-board wiring, carbon comp resistors, audio-grade signal capacitors, Mercury Magnetics transformers, KT66 power valves, custom Alnico speakers – and handmade here in the UK. Review by **Huw Price**

FACTFILE
Gartone Regal 45

DESCRIPTION **Two-channel 45W valve combo with 2x12" custom-voiced Tayden New Vintage alnico speakers, 2 x Harma KT66 power valves, GZ34 rectifier. Made in UK**
PRICE **£2050**

CONTROLS **Volume 1 & 2, Treble, Mid, Bass, Presence**

CONTACT **Gartone Amps**
07796 682530
gartoneamps.co.uk

The Marshall 'Bluesbreaker' combo is one of the shining icons of British rock, and Martin Garton's quest to build an authentic version began when James Skelly of the Coral complained that his reissue Marshall didn't nail Clapton's mid-1960s tone. Garton examined the amp and concluded that there were so many differences that it would be simpler to build a Bluesbreaker from scratch.

An exhaustive period of research followed where every component was analysed. The core ingredients of that landmark tone were identified as the original RS output transformer with its 6.6Kohm primary impedance, KT66 power valves and Celestion G12 alnico speakers; Garton sought out the closest modern equivalents and settled on Mercury Magnetics transformers and Harma KT66 valves. The Celestion G12 lives on as the Alnico Blue but Garton felt its 15W power rating was insufficient. Instead he chose the Tayden New Vintage, voiced specially by the manufacturer for this amp.

Besides ditching the tremolo, the Regal 45 circuit is essentially stock JTM45 with minor alterations to the power supply and bias. Some tweaks were required to conform to today's safety standards and a couple of part values were altered to get vintage voicing with modern components.

Garton contracts out the cabinetwork but he does the covering in-house along with the electronic construction. I had a peek inside and I have never seen anyone do a neater wiring job, though the tolex was lifting slightly on one corner of the faceplate cut-out. Still, it comes with a 10-year warranty.

The Gartone follows the tone stack and two-channel format of the original, minus tremolo

This is a thrilling amp that retains an almost hi-fi-like clarity and definition even when it's distorting like crazy

Sounds

I spoke with Garton a few days before I received his amp, joking that I'd be putting fresh strings on my Lester and brushing up on my 'Beano' licks. He paused, then said, 'It will do that, of course... but it can do lot more.'

Once the amp arrived, I understood why. This is a thrilling amplifier that retains an almost hi-fi clarity, even ➔

Like this? Try this...

Marshall
1962HW
Marshall's latest handwired reissue of the Bluesbreaker combo runs with the correct KT66 power valves and it's fitted with ceramic Celestion Greenbacks; there's also a PCB version for almost £1000 less
RRP **£2549**

Friedman
Small Box Combo
New 50-Watt Marshall-type combo from the current darling of the US boutique amp scene, with two channels, a single Creamback speaker and EL34s doing the hard work
RRP **$2999**

when it's distorting like crazy, and it maintains definition and tightness even when the speakers seem like they're about to burst out of the cabinet. It's also whisper-quiet, with barely any trace of hiss or hum.

Regardless of saturation levels the Regal 45 has a degree of chime and sparkle that allows you to explore the full frequency range of any guitar. You may hear tones from LP-type guitars that you hadn't realised they were capable of. Early Marshall-style circuits are synonymous with overdrive, but the superb quality of this amp's clean tones is equally impressive.

Tonal differences between the Normal and Bright channels are pretty profound. The Bright channel shimmers with an unusual degree of openness and zing; clean tones from humbuckers are not a problem, but plug in a guitar with single-coils and you can do funk, twanging country or even jazz quite easily. In contrast, the Normal channel has a thicker and chewier quality that really suits warmer and more rounded clean tones.

The tone controls produce plenty of frequency swing, the Treble and Presence knobs having a particularly strong influence. This provides a wide range of sounds, allowing the Regal 45 to deliver the goods with a variety of guitars and pickups.

Both volume controls operate smoothly. Rather than jumping suddenly into life or reaching a ceiling above which nothing really changes, volume and overdrive increase gradually. Long before the Regal 45 reaches its raw, creamy, growling zenith, you'll encounter a full spectrum of overdrive tones from the point where single-coils start breaking up between 3 and 4 on the volume controls.

The Tayden New Vintage 12" alnico speakers are spec'ed specially for this amplifier

The Regal 45 is more about complexity, dynamics and harmonic overtones than brutal crunch and sheer aggression

Plenty of amps deliver fine clean tones and overdrive willingly, but dynamic response is surely the factor that separates decent amps from exceptional ones. The Regal 45 is without doubt one of the most dynamic and expressive amps I have ever had the privilege to play through. Hit the strings hard and you'll get deep, growling power chords, while single notes effortlessly sustain with near-vocal quality. Brush the strings lightly and, even at the same settings, the Regal 45 cleans up to display complex, subtle and surprising sweetness.

The Tayden speakers are integral to the tone. It's reasonable to assume that some of the chime and transparency is attributable to the alnico magnets and a degree of speaker breakup certainly augments the amp overdrive as the volume approaches maximum. The open-back cabinet also contributes to this amp's room-filling 3D quality; at times it may even fool you into thinking there's a built-in reverb.

The Harma KT66 output valves recreate the GEC Osram KT66 from grid structure to bottle shape and even brown bases

Verdict

Although the Regal 45 can produce huge amounts of overdrive/distortion, to my ears the sound differs from the EL34-loaded Marshalls I've used. I'd suggest the Regal 45 is more about complexity, dynamic response and harmonic overtones and less about brutal crunch and sheer aggression. In other words, it's a far more sophisticated, versatile and subtle guitar amp. The valve rectifier also provides a touch-feely quality that all but eliminates any intense, spiky transients, making the Regal 45 feel very easy to play even at high volume. It's a remarkable amplifier in every respect, and it's a product that anybody chasing authentic early Marshall tone should consider.

FINAL SCORE

GARTONE REGAL 45	
Build quality	**19**/20
Versatility	**18**/20
Sound	**19**/20
Value for money	**18**/20
Vibe	**18**/20
TOTAL	**92%**

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Standby
On
Off
Bright
Mid
Pull
Deep
Two-Rock

TWO-ROCK
Studio Pro Plus

Clarity, headroom and class are the watchwords with this USA-built combo, which adds tremolo and an 'expansion' control to Two-Rock's best-selling model, the Studio Pro. Review by **Huw Price**

The Two-Rock Studio Pro Plus has such an extensive range of features and tones that we're going to keep the description brief and get on to the tone test as quickly as possible. The controls are listed in the Factfile and they behave in the conventional manner. Build quality impresses greatly, from the immaculate plywood combo cabinet to the hybrid point-to-point/eyelet-board wiring.

The cabinet houses a 12" Celestion G12-65; there's a spring reverb tank at the bottom, and some of the Studio Pro's most influential features are on the rear of the chassis. A Contour control rolls off high frequencies and also seems to shift the resonance of the midrange. There's a buffered effects loop, with a return level control/bright switch that remains operative whether the loop's active or not and acts as an extra volume control, presumably between preamp and power stage.

Two-Rock's new 'pickup loading' control has five settings that vary the impedance relationship between the pickup and the first gain stage (this affects tone, dynamic response and gain, as we'll discover later). A foot controller activates the tremolo and also the 'expansion' circuit that's only featured on the Plus version of the Studio Pro. The corresponding Expansion control provides an adjustable EQ bypass, which increases gain and midrange. Loaded with Tung-Sol valves and USA-made transformers, the Studio Pro generates 22W via a pair of 6V6 power valves.

First impression of the Studio Pro is 'blackface with balls': it's clear, responsive and unusually smooth

Sounds

Many low-Wattage valve amps seem to be geared towards crunchy overdriven tones at ear-friendly levels. The Studio Pro Plus is way more sophisticated than that, and the subtle tweaks provided by the various loading settings and pull switches will intrigue discerning players with keen ears.

Starting with low Gain and high Master settings, the first impressions are 'blackface with balls'. It's very clear and dynamically responsive, revealing clear differences between supposedly similar guitars. The treble has a sweetly glistening chime that ↦

FACTFILE

TWO-ROCK STUDIO PRO PLUS

DESCRIPTION **Single-channel 22W valve combo with 12" Celestion G12-65 speaker, spring reverb and tremolo. Made in the USA**

PRICE **£2299**

CONTROLS **Treble (with push/pull treble boost), Middle (with push/pull middle boost), Bass (with push/pull bass boost), Gain, Master, Expansion, Reverb send, Reverb return, Tremolo speed, Tremolo intensity, Global contour, Effects loop return (with push/pull bright boost) and Loading switch**

CONTACT **Coda Music**
01438 350815
01582 725625
www.two-rock.com

Like this? Try this...

Fuchs
Overdrive
Supreme-30 112
This 30W combo is based on the Dumble Overdrive Special, and is handbuilt with two 6V6s in the power stage and a spring reverb
RRP **$3040**

Brown Note
D'Lite 22
With tonal reference points similar to the Two-Rock, this amp has two 6V6 valves producing 22W through a Celestion G12-65
RRP **$2445**

Ceriatone
Overtone Special Combo
This is pretty obviously a 50W Dumble clone, and it's also available as a head or a combo with two 12" speakers; you can buy it in kit form too
RRP **$1400**

is simultaneously delicate yet strong, and both single notes and chords have a percussive attack that stops short of spikiness. You might describe the Studio Pro's clean tones as being 'joined up'. With some amps a compressor seems almost mandatory – especially at fairly low volume – but this one is unusually playable and smooth. The sheer clarity is also pretty amazing, but there's nothing sterile about it.

Turning up the Gain control increases overdrive very gradually, and it remains useful throughout its range. This allows very fine adjustments to the amount of overdrive and the way that overdrive responds to playing dynamics. At full Gain the Studio Pro has a thick, throaty overdriven sound with an expressive attack that recalls Robben Ford, John Mayer and Larry Carlton. Dare we say Dumble? I think we might have to.

When encountering a feature like the pickup loading control for the first time, it's tempting to try it at both extremes. Maximum drops the level and rolls off the high frequencies, and also seems to dry out the sound and provide more clean headroom. It's very much a 'studio' tone, comparable to mixing a directly recorded guitar signal with an amp; it's very effective for clean funk or even jazz sounds. The minimum loading setting sounds just like a regular amp input, but when playing with cleaner settings we most enjoyed the loading control one or two notches off the minimum. The attack is smoothed over, edgy pickups are subdued, and the mids open up in a subtle way.

The footswitch turns on tremolo and expansion, but not the reverb

The Celestion G12-65 is an integral part of the Studio Pro's character

At full gain the Studio Pro has a thick, throaty overdrive that recalls Robben Ford, John Mayer and Larry Carlton

The tone controls feel more like using a valve studio equaliser. Everything produces interesting results, and even at extreme settings the tone doesn't sound unnatural or processed. We generally chose to keep one of the treble boosts active, even with the maple-board Fenders this amp seems to relish. The bass boost gives the low end massive girth without boominess and works superbly with the treble boost and a bit of mid-cut for muscular Texas-tinged rhythm tones.

The midrange boost switch does what you'd expect, but the expansion feature also boosts the mids. Turning Expansion up adds gain plus a chewy midrange that demands you dig in to make the Studio Pro bark – yet you can play lighter or notch your guitar volume down to go back to shimmering cleans. The clever part is the way it smooths the treble and adds overdrive without imposing a volume boost. You can get that by turning Expansion way up, but with a bit of tweaking you can use it to switch between clean and overdrive with no sense of compromise with the shared tone controls.

The reverb sounds glorious, and having user control over the input and output levels is a good idea. Low input with high output sounds blatty and more metallic, which works well for edgy blues and rock. Bumping the input creates a sweeter and smoother tone that's remarkably three-dimensional. The tremolo is chesty and satisfying, but there is a short delay after engagement before the effect fades in.

If you prefer to get overdrive, crunch and distortion tones from your preamp valves, then the Studio Pro isn't a 'rock amp' in the modern sense. PAFs and P90s can push things into classic/blues rock power chords, but you'll need to get the power valves involved to reach the upper extremes of the Studio Pro's overdrive capabilities... and it does get pretty loud.

Verdict

Overall, the Studio Pro offers the antithesis of spongy tweed tone or Marshall-style rawness. Edgier players might find it a bit polite, but don't imagine it's only for playing executive blues on a private stock axe; there's nothing bland about this amp. There's a lot going on and a familiarisation period will be needed, but it's worth the effort.

Two-Rock has selected a speaker known for smooth treble and tightly controlled bass. This pays dividends, as the loading and treble boost features can be used to shape the top-end response rather than just controlling harshness. Searching for something to criticise, we could only point to the knobs, which might look more at home on a mid-priced stompbox.

The conclusion? In a high-end market bursting with vintage replicas and multi-channel monsters, this is something different: a refined, sophisticated, versatile and intriguing amp.

FINAL SCORE

TWO-ROCK STUDIO PRO PLUS	
Build quality	**19**/20
Versatility	**19**/20
Sound	**19**/20
Value for money	**15**/20
Vibe	**18**/20
TOTAL	**90%**

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A Musical Evolution of TIME, SCALE & ABILITY

Norman Mitchell of Old Hat Guitars knows as much about the early development of guitar amps as just about anyone... and has a droolable collection to back it up. **Lars Mullen** got the full tour - and a pretty extensive history lesson along the way

It's Britain, it's the late '50s and just about every teenager wants to be a guitar player. Spurred on by limited pop music on the airwaves, relayed by poor-quality radios, it's a tough time to be a dreamer. The available guitars and amps are expensive and very limited: if you're a dab hand with a soldering iron, you'll have a lot of friends pleading for you to turn their family radiogram into a basic guitar amp. Kids in the 1950s knew the sound they wanted, but achieving the goal was an uphill struggle.

Even today, if you own an amp and a guitar, in some small way you are your own sound engineer as you strive to fulfil 'that' sound you hear in your head. And more often than not, the sound in question is of a really old combo at full tilt. It would seem, then, that we have gone full circle – as so many players are smitten by the warm valve tones created from amps from the '50s and '60s, predominantly from the UK and USA. For more than 60 years guitar players and experts have disagreed and bickered over the smallest details regarding how a unique combination of valves, resistors, transformers, capacitors, speakers and cabinets contribute in so many ways to a guitar's amplified sound.

'Back then there were a lot of brands all looking for their own innovations,' says Norman Mitchell, one of the world's leading experts on vintage guitars and amplifiers. 'They wanted to make their products stand out while trying to stay within an affordable price bracket. Though a variety of speaker manufactures were used, the designs of the circuits were very similar.

'You really didn't have a lot of choice back then, especially with the output. You had slightly loud, louder and louder still, of what was in reality the same denominator of sound from each brand – as they were all using the same components.

'For the first generation of guitar amplifiers it was all a bit hit-and-miss, as most of them were adapted from old radio circuits. There was a big school of thought as to what made a good amplifier – in theory they knew what should work – but it was often the case that, if they got a good 'un, it was more about luck than judgement.

'Some were good and some were absolute garbage. My colleagues in the business and myself have never really been able to quantify what made a good amp from that period; it's something we call the snake-oil factor. But during the 1940s and '50s, a learning curve developed within the volume and tone circuits used in the early amplifiers. These little old

amps weren't designed to overdrive – this was a secondary movement that happened by accident and that players started to exploit. There was a sterling effort to make them as clean as possible.

'When Chuck Berry toured in the mid '60s, his stage rig was a Gibson ES-355 and Gibson's Titan Series amps and cabs. The Titan was their biggest piggyback rig loaded with the European-built Norelco speakers, which were designed for hi-fi. He would just turn it way up for a loud and clear sound and use the natural sustain from the guitar. I saw him use a Titan on one of the UK tours and thought it sounded amazing, so I bought myself a Titan... and a 355, of course!'

Norman has more classic amps than you might think possible, yet even the old ones gathering dust still get warmed up and played on a regular basis.

'So many older players still own their original little combos from the '50s and '60s as I do,' he says. 'Like the Selmer Little Giant and the Watkins Scout, the latter of which was regarded at the time as the mutt's nuts – it was one you could get that worked and was reliable.'

With the event of hire purchase, larger amps were now within reach of many players as long as they could keep up with the payments.

'Hire purchase on music-related goods opened up the world for guitar players. The likes of Bell Musical Instruments in Surbiton in Surrey offered many guitar and amplifier brands including Watkins, Hofner, Hagstrom, Futurama, Framus, Rosetti and a range of Fender, Selmer and Bird amps. For most young players, the payments were via the 'bank of mum and dad', paper rounds, delivering groceries or car-washing duties. The original Bell catalogue is now a legend in itself.

'Broadway was another catalogue model on offer from Bell. This was an entry-level guitar and amp range, both of which I have here. They were of course quite primitive but, no doubt, like so many of these now collectable amps and guitars, helped hundreds of young players cut their teeth.

'The Broadway amp is rated at about six Watts and fitted with a tremolo effect, dating from around late 1958 or '59. Again, it's based on the same circuitry as so many others from this period, and loaded with an Elac speaker. Many guitarists who can remember this amp, along with the Broadway Plectric guitar, will say they can both justify a place in the British rock'n'roll hall of fame.

'With the advent of post-war technology, amp makers had access to better-quality valves and transformers that contributed much-needed reliability, especially with the earthing systems. A lot of these early combos carried a warning via a metal tag on the back. Watkins amps, for example, said: "It is ➔

A trio of Selmers from the early-'60s 'blue period'

Small but sweet: the Watkins Scout

The Scout's angular design extended to its rear panel

Broadway amp from the Bell catalogue

The Broadway Plectric came with its amp as a package

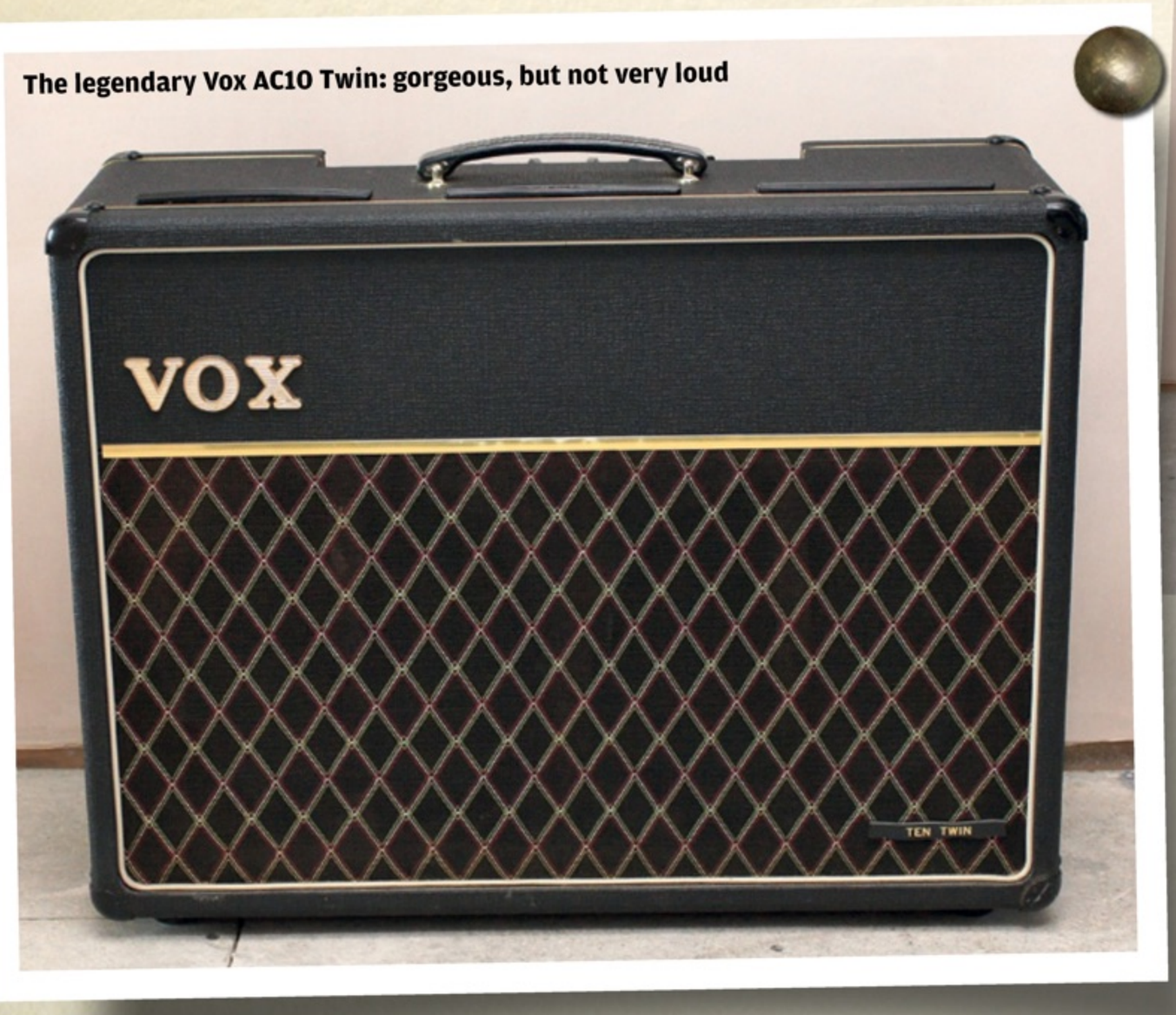
advisable to earth this instrument whenever possible." Makes you cringe now, but compared to modern standards, the wiring in some of the clubs in the '50s and '60s had a lot to answer for.

'I had many electric shocks on stage back then by touching the guitar strings and holding the mic stand, which was very scary. The shocks were enough to worry about but there was also a problem, maybe one of less concern, with outside interference. I used a Bird amplifier quite a bit – it wasn't bad, I have to say, but if I turned the volume control up past number 6 it picked up the BBC Radio Light Programme.'

The Shadows were possibly the most popular band in the UK during the late '50s, but they reached a point where their Vox AC15s were not getting above the screams of the fans. Norman continues, 'During the late '50s, eight or 10 Watts like the Vox AC10 Twin was regarded as a powerful amp, but it all started to open up when 15W and 20W amps arrived, again from the likes of Vox, as used by the Shadows. The Vox association with Cliff Richard and the Shadows is of course legendary, but they needed bigger amps to compete with the screams of the audience, and also to hear themselves on stage. The magical figure was 30 Watts, proven when Dick Denney designed the AC30, a combo amp that is still regarded today by many guitarists – who may have started out with an AC10 or AC 15 – as the Holy Grail. The AC30 dominated the early '60s as the loudest amp by far, until of course Jim Marshall came on the scene.

'I'd like to just go back a bit here and talk about my own evolution in guitar amplification. This started when I played in a young band at my local boys' club. We had two guitars going through a 10-Watt Watkins Westminster combo – that's all we had. The Westminster was the company's first generation of guitar amps, available at the time in three colours: blue and cream, maroon and cream or black and cream, all with little gold dots – turquoise and cream versions followed later. It was the first Watkins amp to be produced in any quantity, around 1954, and was actually capable of producing a decent sound with a substantial volume level and a very useable built-in tremolo effect. These amps would also break up fairly early on to deliver a lovely distorted sound when you started to stretch them.

'During the late '50s the Vox AC10 Twin was seen as a powerful amp, but it all started to open up when 15W and 20W amps arrived'



The legendary Vox AC10 Twin: gorgeous, but not very loud

Vox goes large: the Super Twin head and 2x12" cabinet

The Super Twin has a standard AC30 control panel

Young Norman's amp of choice, the Watkins Westminster

'But the demands of the music soon outstripped by far the capabilities of the equipment – these little amps were built in the context of the dance band orchestra, just to raise the guitar sound to compete with the rest of the instruments. Now all of a sudden the guitar was the dominant feature of the pop band and it needed another lift to compete with the audience. From a tonal point of view, the Watkins models were OK, but the problem was always volume.

Two inputs, three knobs, 10 Watts

'In the early '60s the choice of guitar amplification was still relatively small. Gibson were very much on the fringes with a few new models while, also across the Atlantic, Fender were well away – but their amps were very thin on the ground in the UK because of the import restrictions on products from the USA at that time.

'There were really only three choices of amplification that were of any consequence in Great Britain. Charlie Watkins was providing us with affordable combos, Selmer amps were sat in the mid-price range, and top of the heap was Vox; it remained this way for some time.

'Selmer were gradually increasing the Wattage stakes – next they launched the Triumph Reverb, rated at 18 Watts and loaded with three elliptical Celestion speakers. So it was a slow but steady uphill climb. It was a time, of course, when most brands were jumping on the bandwagon by installing reverb. Technology was slowly getting better and some of these reverb circuits were sounding pretty good. They were a far cry from earlier attempts from the likes of Bird, who actually strung a wire across two gramophone styluses to create the effect.

'Selmer then moved on to the 20-Watt Constellation Twin, followed by the Zodiac Twin 30 and Twin 50 with foldaway leg supports, all with the famous 'crocodile skin' covering. Today, amps with this finish are known as Selmer's croc-skin period and are highly sought-after by collectors. I have ➔➔

Selmer's Triumph Reverb offered a full 18 Watts

The Triumph's distinctive trio of elliptical Celestion speakers

The Constellation Twin upped the power to 20W

A nice example of the 'croc-skin' finish

Selmer Zodiac Twin 50: note 'blinking eye' in upper centre of grille cloth

This Zodiac still has its original Selmer-branded speakers

The foldaway legs: useful, maybe, but not terribly elegant

The Zodiac's control panel with its push-button tone selectors

Gibson GA-40: a partner for the Les Paul guitar...

...in suitably classy two-tone brown

quite a bit of Selmer memorabilia here as well, like original guarantee cards, operating instructions and diagrams, seen here perched on this cute little Selmer Concord.

'These amps were not only cosmetically good; they also sounded really good and were a lot more reliable. Unlike the Vox AC30, they were designed to be ultra-clean and free of distortion. So if you wanted a fuzz sound you had to add that with a pedal, and you knew it was a Selmer visually from afar because of the green 'blinking eye' in the front between the speakers, as it pulsed in time with the speed of the tremolo effect.

'Meanwhile, my little band at the time back in the boys' club had upgraded to the larger Watkins Dominator and finally the ultimate, a Vox AC30. Mind you, in the mid-'60s the ultimate setup to be seen and heard with was the 100-Watt Marshall stack. It didn't matter if you didn't have the strength to move it around, if you had this rig you'd made it!

Miraculously preserved Selmer paperwork!

'In its day, the four-channel, 1x12", 14-Watt Gibson Les Paul GA-40 from 1952 was the cream of the crop in the USA. But again, very few came into the UK because of the import duties, and if you did find one, they were significantly more expensive compared to their British counterparts. During its three-year production period between '52 and '54, 3261 of these were sold in the USA. Like some of the early American guitars, a few did manage to arrive here, probably with members of the Armed Forces who decided to stay here in the UK or left them here when they returned home.

'The GA-40 was originally designed to go with the Les Paul guitar, and I have a '52 Goldtop that I play through this one. They're the perfect match, the answer to both sides of the sonic equation. At 14 Watts it's not deafening, but it was surely a significant upgrade in volume in the early '50s, and the real advantage is the beautiful tone. It's another, I think, that works visually with the two-tone brown covering.

'I also have the smaller Gibson GA-20, which is literally a scaled-down version of the same amp... and if we go back a little further, here's the first version of the GA-20. This one was originally designed for lap steel guitars – again 12-14 Watts, built between '52 and '53. This was another combo sold as a set with a guitar, which was still a popular trend. For instance, if you bought a Gibson ES-125, the price of $125 included the guitar and its matching amplifier – it was small, but that was the package.

'It was later that the bigger and beefier amps came on the scene – a really sizeable

The GA-20: basically a scaled-down GA-40

one being the Gibson GA-90 combo, the biggest in the range and rated at 25 Watts. It ran from '53 to '60, and was designed to produce a super-clean, crisp sound through its six 10" speakers. The package partner here was the Gibson ES-295 guitar. Gibson was certainly innovative during this period, and launched the GA-88 stereo version between '59 and '61. I think I also have one of those here somewhere...'

Next up, a familiar bass amp name. But what's in a name? Norman explains: 'I really like Ampeg, they're such great little amps, but I wonder how many people know how the company name actually evolved. It started way back when a bull fiddle player needed a way of amplifying his large string bass instrument – once again, to compete with the other instruments in the orchestra. So the forerunners of the Ampeg research and development team designed a microphone that latched onto the peg that protrudes from the body of said bull fiddle.

'This would send the signal to an amp, hence it was called... an amp-peg! When they produced an amp to match this system, they simply called the company Ampeg. They then went on to be more comprehensive, covering all aspects of bass amplification – and as we know, they still make some of the finest bass guitar amps in the world.

'I remember going to see my pal Waddy, the bass player in the band the Berkeley Squares, at a typical '60s venue – the classic big ballroom-type place – and as I walked in, all I could hear was this enormous bass sound, which was coming from what would have been one of the very early Ampeg Portaflex system combos.

'It was inevitable that Ampeg would expand into the guitar world and cater for most styles of music, from jazz to rock, while also being attractive to look at. Some of the stereo guitar combos had left and right satellite speakers to spread the sound. I've been an Ampeg fan ever since.

The GA-20 cranks out around 14W

'I have two of their guitar combos here: the Reverbojet and the Rocket, both multi-channel and in blue with the 'splatter' paint finish. The smaller Rocket has tremolo and an input for an accordion, as it wasn't just banjos, guitars and double basses that needed to be louder on the stage back then.

'Before the advent of its signature blue colour, Ampeg produced this earlier Reverbojet with a stepped bronze control panel. While it also had the accordion input, this model was very short-lived. Its unusual visual character might now attract the amp collector, but back then it really didn't help with sales.

'You'll notice that several of the combos I have, not only the Ampeg models, have an input for an accordion. A lot of western swing bands had an accordion player, as did a lot ➔

The original tan version of the Gibson GA-20

This amp was originally designed for lap steel

Ampeg Rocket and, behind it, a Reverbojet

Matching Ampegs in blue 'splatter' vinyl

Note the input for accordion

'A lot of amps were produced to fit requirements which were controlled by fashion'

of US ensembles that consisted of a Hawaiian guitar and an accordion. So a lot of these amps were produced to fit the requirements of the day, which were controlled by fashion.

A vintage Epiphone Electra combo is next in line – and you may notice that it doesn't appear to have any controls. Norman has the answers: 'Epiphone was another manufacture who thought it advantageous to market the amp and the guitar as a pair. I have several examples in my collection, but I've included this Epiphone Electar guitar/amp pairing as I feel it's quite unique. It was an extremely expensive rig, and that's probably why hardly any exist in Europe. The amp panel itself just has an on/off switch, inputs and a voltage selector. All the controls – including frequency and depth for the tremolo and reverb, tremolo and reverb on/off and a tone section with six switches called a Tonexpressor – are on the guitar, along with its normal volume and tone controls for the single mini-humbucker.

'The guitar itself is very well made and doffs its cap towards the Gibson 335 body shape. If you gigged with this setup, it was essential that you didn't forget the large seven-core guitar lead! Mind you, if you did, the guitar could still be used with a standard guitar lead – and maybe with another Epiphone amp like this Pathfinder, again with a single 12" speaker that does a

An earlier version of the Reverbojet

The stepped control panel is, um, unusual

Epiphone package deal: Electar amp and its partner guitar

What, no controls? Check the guitar's pickguard...

An Epiphone amp with knobs on: the Pathfinder

The Pathfinder combo excels at clean tones

good job of delivering the amp's high-quality, ultra-clean sound.

'The early Epiphone Electar combos were not that outrageous from a volume point of view; they were produced mainly for lap steel players in the '50s and then the early '60s, when they were bought by Gibson. Models from both companies were virtually identical in terms of the electrics; it was the cosmetics that denoted one or the other.'

There are many myths and legends from amplifier manufactures claiming high-profile artists used their models. Some are without doubt very true – the Beatles using Voxes or Jimi Hendrix playing through Marshalls, for example. Jimmy Page is reported to have used a modified '62 Supro 1690T Coronado combo – or at least a Supro of some kind – on the first two Led Zeppelin albums and for the solo in *Stairway To Heaven*.

'Supro were popular without a doubt,' says Norman. 'These were great amps, available in a variety of speaker and Wattage permutations, and have often been the first choice for a host of top players. They were a range of amplifiers made by Valco in Chicago as a mail order brand. So depending on where you bought one in the USA, you would get the same amp but with a different badge. This one I have here with a pair of 12" Jensen speakers is a Supro Thunderbolt dating from 1964. It was advertised as 'unused', and I was of course a little doubtful as to how clean 'unused' would mean. Well, I couldn't believe it: as you can see, it's like it's just come out of the factory, let alone over 50 years ago.'

A lot of guitar players agree that the guitar amplifiers we take for granted today didn't really start to develop until Leo Fender began to produce his own models – and even then, a lot of what was good or bad was decided by factors that were virtually unidentifiable.

'I think Leo Fender was not only the biggest amplifier manufacturer in the '50s and '60s; he also made some fantastic amps,' asserts Norman. 'I feel he was a major contributor to the golden age of amp-building.

'I have some ratty, threadbare models and some nice blondes. For a long time, my working guitar and amp rig during the '60s was a Telecaster and a Fender Tremolux loaded with a pair of 10" Oxford speakers. It was so loud and clear that you could slice ham in the next road with it. But it was the perfect match, a Fender amp and a guitar with single-coil pickups – in the same way that P90s or humbuckers are when played through the early Gibson combos.

'So now we have the trend for small amps, where players have gone back to look for a quality of sound by stretching what's within and miking up the results – be it clean or overdriven – and delivering it through a large PA system. Let's not forget, though, that it was rock'n'roll that introduced so many of us to the electric guitar... and amplifier.'

Nope, this immaculate Supro is not a reissue

Supro Thunderbolt, circa 1964: Jimmy Page would approve

CODA...

LET'S ROCK!

This photo of Les Paul, from way back in the 1940s, reminds us just how far amplifiers have come since then... although, given Paul's inventive mind, maybe he already envisaged a future that included a wall of stacks, not to mention digital modelling.

In some ways, however, that little Gibson amp at Les Paul's feet will still look the very definition of cool to plenty – and there are many fine amp builders who are recreating both the retro looks and the great tones of yesteryear that you'll hear on those old records. Long may it all continue!

Photo: Michael Ochs Archives / Getty Images

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